CANADIAN AGRICULTURAL PARTNERSHIP



NOVA SCOTIA DEPARTMENT OF AGRICULTURE

Goat Production Manual

A Guide for 4-H Leaders and Beginning Farmers

NOVA SCOTIA

Canada

Goat Production Manual
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Disclaimer

This manual is intended to be a resource that provides educational information for 4-H leaders and people who are interested in raising livestock. It covers topics such as breeds, husbandry, nutrition, health, safety, and business.

This manual's appendix includes a section that outlines topics and activities for 4-H meetings. The content included in this guide is meant for reference only.

Readers who require additional information, specific regulations, or more details are asked to contact the Nova Scotia Department of Agriculture Regional offices for assistance: https://novascotia.ca/agri/programs-and-services/regional-services/

While steps have been taken to ensure the content in this booklet is accurate, recommendations, guidelines, and regulations may change at any time. Authority rests with the relevant regulatory body.

Thank You

Special thanks to Jonathan Wort (ruminant livestock specialist, Perennia) for assisting with reviewing this collective resource.

Introduction

The modern goats of today developed as a result of the domestication of various populations of wild goats. Domesticated goats (*Capra aegagrus hircus*) are small ruminants that are farmed for meat, milk, fibre, and hides.

Goats were first domesticated in Western Asia, specifically in the Fertile Crescent around 10,000 years ago. They are one of the oldest domesticated species and historically played an important role in advancing human civilization from hunter-gatherer to agricultural settlement lifestyles. Today, goats can be found around the world in a wide range of production systems in various climates and environments.

Section 1: Selecting an Animal

Before selecting a goat, you should ask yourself what kind of goat you want. Do you want a goat for a pet, a show animal, meat production, milk production, or fibre production? Also, it is important to understand what kind of goat you can provide and care for.

Purebred vs. Grade

Goats can be a grade, purebred, Canadian, recorded grades, or combinations of each breed.

- **Grade goat**—Does not have registration papers. It is often a mixture of different breeds and of unknown heritage.
- **Purebred goat**—Has registration papers and its entire pedigree is one breed.
- **Canadian**—Has registration papers and is at least 7/8 purebred of any of the recognized breeds.
- **Recorded grade**—Is either ½ or 3/4 purebred and has registration papers.

If you are buying a purebred, Canadian, or recorded grade goat, you should receive registration papers with the animal. The seller is responsible for sending the registration papers to the Canadian Livestock Records Corporation to be transferred into your name. This should take four to six weeks.

A goat's registration papers are a permanent record of its family history. Many desirable traits and qualities can be traced though registration papers. However, bear in mind that your animal need not be registered to be a useful animal. It is better to have a good grade goat than a poor purebred. Do not select a kid just because it is registered, as registration papers do not guarantee the goat will be what you are looking for.

What to Look for in a Goat

Look for these general characteristics when selecting a goat:

- Large, alert, growing, and upstanding kid
- Free from disease and injury
- Good appetite, vigorous, and healthy

Dairy Goats

The most important characteristics of a dairy goat:

- General appearance
- Body capacity
- Mammary system
- Dairy character

A good milking doe produces at least 3.62 kg (8 lbs.) of milk a day. A doe should be selected with great care since an outstanding doe may be the backbone of a productive herd.

A dairy goat should have the following:

- An excellent temperament
- Good body development

- Prominent hip bones
- Thin thighs to provide plenty of room for a round, well-attached udder of fair size
- Good length through the neck and body
- A thin and graceful neck with or without wattles
- A feminine head
- A long middle, and the ribs should have great spring and depth; this indicates a capacity for consuming large amounts of roughage as well as the ability to carry two or more kids
- Loose and pliable skin free from dryness; goats in proper condition have fine, silky hair
- Clear and bright eyes

The milking potential of a doe cannot be estimated by the size of its udder, as a large udder may give a very small amount of milk, especially if it is fleshy and lacking quality. The udder of a good dairy doe should

- be thin-skinned rather than meaty
- show plenty of capacity
- be well attached and supported by the suspension ligament
- have teats that hang straight down and are about the size of a thumb
- be soft to the touch and have a collapsed appearance when freshly milke

Meat Goats

A meat goat has six important characteristics:

1. Muscle
2. Structural correctness
3. Volume and capacity
4. Style and balance
5. Growth and potential
6. Functioning udder (does)

The muscling of a meat goat is its strongest attribute. In order to support muscling, the goat's bone structure needs to be correct. A meat goat should have

- a wide stance to accommodate heavy muscling
- a wide chest floor, with bold shoulders and a prominent forearm muscle; the chest and forearm are the best indicators of muscling in a goat
- a deep, heavily muscled leg and rump; when viewed from behind, the widest part of its leg should be the stifle area
- a broad, thick back and loin
- a long body with adequate depth and spring of rib
- all the parts of its body blending together for style and correctness
- great growth potential; the quicker an animal grows, the fewer days you have to feed them, and the more profitable they are

Breeds of Dairy Goats

To build a quality herd, you need to start with good breeding stock. Do your research to determine which breed of goat has the characteristics you are looking for. In Canada there are six recognized breeds of dairy goats.

Toggenburg

The Toggenburg goat is native to the Toggenburg Valley of Switzerland and has been a recognized purebred in Canada since 1917. This breed is medium size, sturdy, vigorous, and alert in appearance. The ears are erect and carried forward. Facial lines may be dished or straight, never Roman. The hair is soft and fine. Colouring is solid brown varying from light fawn to dark chocolate with no preference to shade.

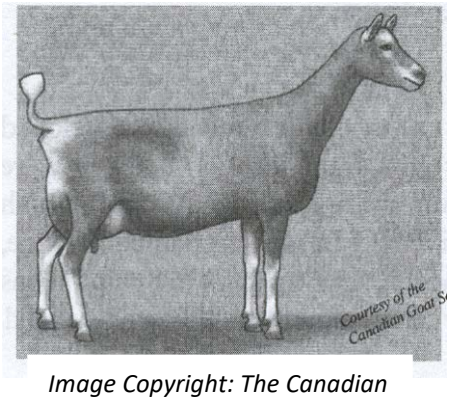


Image Copyright: The Canadian Goat Society

The Toggenburg has distinct white markings as follows:

- White ears with a dark spot in the middle
- Two white stripes down the face, above each eye, to the muzzle
- Hind legs are white from hocks to hooves
- Forelegs are white from the knee downward; a dark vertical stripe is acceptable below the knee
- A white triangle on each side of the tail
- A white spot may be present at the root of the wattles, or in that area if no wattles are present
- Varying degrees of cream markings instead of pure white are acceptable but not desirable

Females typically weigh 40–45 kg (88–99 lbs.) while males weigh 60–65 kg (132–143 lbs.). Mature does should be 66 cm (26 in.) at the withers and mature bucks should be 71 cm (28 in.) at the withers; however, most Toggenburgs exceed this height. On official testing, does of this breed produce an average of 915 kg (2,017 lbs.) of milk during a 305-day lactation.

Saanen

Purebred Saanens were one of the first breeds imported to North America from Switzerland. They are productive, resistant to the cold, and docile. Saanens are medium to large in size, with rugged bone and plenty of vigor. Does should be feminine and not coarse.

A Saanen is light cream or preferably white in colour. Coloured spots on the skin and small spots of colour in the hair are allowed for conformation, but not desirable. The hair should be short and fine, although a fringe over the spine and thighs is often present. Ears should be erect and point forward. The face should be straight or dished, with a Roman nose being an undesirable characteristic

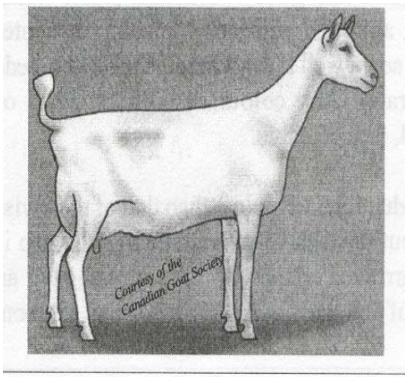


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Mature Saanen females in good flesh will average 55 kg (121 lbs.) and males, 84 kg (185 lbs.) in body weight. Mature Saanen does should stand 76 cm (30 in.) at the withers and bucks, 81 cm (32 in.). The Saanen is known for its high milk production; at the peak of production, a good doe will give 5.5–8.0 kg (12–17.6 lbs.) a day.

Nubian

The Anglo-Nubian originated in England from the crossing of English does with Nubian bucks from Upper Egypt and Ethiopia. The Nubian is known for its high butterfat.

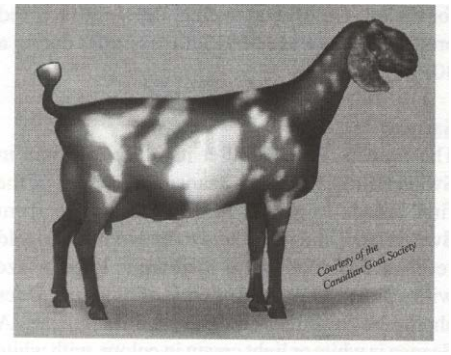


Image Copyright: The Canadian Goat Society

A Nubian head shows the distinctive breed characteristic: a strongly convexed head. The ears are wide, drooping, and long. They extend at least 2.5 cm (1 in.) beyond the muzzle when held flat along the face. The ears have well-defined cartilage and lie close to the head at the temple, then slightly flare out and forward at the rounded tip, forming a bell shape. Nubians have short, fine, and glossy hair.

While Nubians prefer warm climates, they can adapt to a colder climate with good housing. The Nubian can come in any colour, solid or patterned. Mature Nubian does measure 76 cm (30 in.) at the withers and mature bucks, 81 cm (32 in.) at the withers. Milk production is a bit less than that of the Swiss breeds, although selective breeding is narrowing this gap. On official test, does give an average of 763 kg (1,622 lbs.) of milk in a 305-day lactation.

Alpine

The Alpine is a large and graceful goat, with milk production comparable to that of the Saanen. This breed was most likely derived from the French-Swiss and rock-Alpine ancestry and is now represented by several subbreeds.

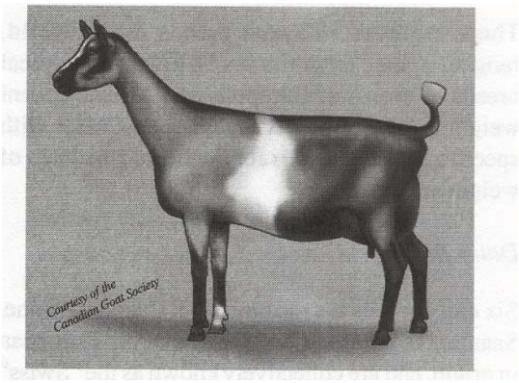


Image Copyright: The Canadian Goat Society

The Alpine dairy goat is a medium- to large-sized goat and is the only breed with upright ears. They are hardy, adaptable animals that thrive in any climate. Their hair is short to medium in length. They have a straight face and a Roman nose is not desirable for conformation. Toggenburg colour and markings or an all-white body colour is also not desirable. On official test, does give an average of 915 kg (2,017 lbs.) of milk during a 305-day lactation.

Alpine colours are described as follows:

- **Cou blanc**—White neck with dark hindquarters
- **Cou clair**—Tan neck and white hindquarters
- **Cou noir**—Black neck with white hindquarters
- **Chamoisee**—Tan to red/yellow colour.
- **Sundgau**—Black with white underbelly, legs, and facial stripes

American LaMancha

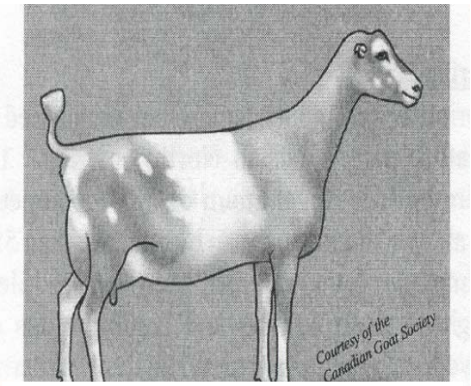


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The American LaMancha is a recently developed breed of dairy goat from the United States of America. They were developed from short-eared goats of Spanish origin. They have excellent dairy temperament and are an all-around sturdy animal that can withstand a great deal of hardship and still produce. Through official testing, this breed has established itself in milk production with high butterfat content. The average production for a LaMancha doe is about 915 kg (2,017 lbs.) in a 305-day lactation.

The LaMancha face is straight with ears distinctive of the breed. There are two types of ears: the gopher ears and the elf ears. Small gopher ears are a dominant trait. This means that if a goat with this characteristic is bred, all the resulting offspring will have this type of ear**.** Any colour or combination of colours is acceptable, with no preferences. The hair is short, fine, and glossy. Mature LaMancha does should be 71 cm (28 in.) at the withers and bucks, 76 cm (30 in.).

Oberhasli

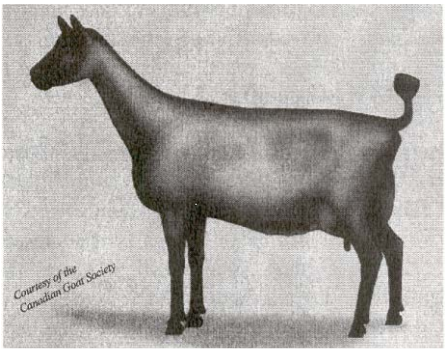


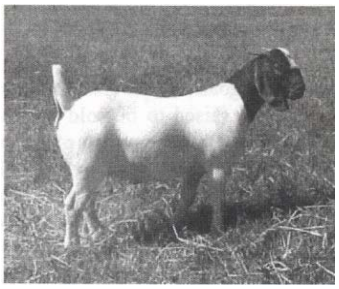
Image Copyright: The Canadian Goat Society

The Oberhasli breed is the most recent to join the Canadian Goat Society registry. This breed had been classed with the Alpines for many years until American breeders separated out the animals previously called Swiss Alpines. Oberhasli are strikingly coloured; the does may be red-bay or pure black, but bucks must have the red chamoisee colouring. No significant amount of white is allowed in the coat. The ears are upright, and the face is dished or slightly straight. Mature does are around 71 cm (28 in.) at the withers, while mature bucks are 76 cm (30 in.).

Market Goat Breeds

Market goats are raised and sold as chevons to be used for meat. Chevon is a very lean meat, similar to lamb. A market goat is not a particular breed of goat, but a type of goat chosen for its heavier body and higher meat-to-bone ratio. Typically, meat goats are Nubian or Nubian crosses. In the 1990s, the South African Boer was imported into North America. This breed has been specifically bred for its meat and carcass traits. Around the same time, the kiko was introduced to Canada.

South African Boer



These goats were developed in South Africa for their meat, hardiness, and brush-control abilities. They have been specifically bred for their meat carcass traits for more than 40 years. They are large-framed animals and resemble Nubians; however, the two breeds differ in size. Mature weights fall between 90 and 160 kg (198–352 lbs.) for males and 55–90 kg (121–198 lbs.) for females. Through extensive selection, growth rates have continued to increase, so average weight at weaning is 25–30 kg (55–66 lbs.).

Boer goats are known for their excellent mothering ability, high prolificacy (1.93 kids per doe), and high fertility (98 per cent of does bred have live kids). Boers are generally white with a reddish-brown head and they usually have a white blaze down the middle of their face. Their ears are long and hang down the sides of their faces. A Boer goat should have a deep chest, good back, strong and heavy shoulders, and heavy muscling in the rump.

Kiko

The kiko goat is a composite breed that was developed in New Zealand in the 1980s. It is a hardy medium- to large-framed breed that was bred for survival, growth, and maternal traits.

Mature weights for bucks are on average 113–136 kg (250–300lbs.) and for does they are 45–68kg (100–150lbs.).

Kikos are known for their excellent mothering ability, prolificacy, high fertility, and resistance to internal parasites. Kikos have a dominant coat colour of white but have other accepted colour patterns. A kiko should have a strong head with well-fitting jaws, a medium-length muscular neck, well-muscled tight shoulders, strong pasterns and hocks, well-fleshed loin, a strong back, and a broad rump.

Pygmy

The pygmy goat is a recognized breed of miniature goats in Canada. On average, a full-grown doe stands between 40 to 50 cm (15–19 in.) at the withers. The head and legs are short, but should be balanced in relation to body length. A goat in milk may give up to .2 L (.44 gal.) of milk per day. Because they are compact, pygmies do not require the amount of space and food larger goat breeds need.



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Conformation

You should know the parts of the goat and what an ideal goat looks like. This way you can properly compare different goats, and identify the body parts of a goat using the correct terminology.

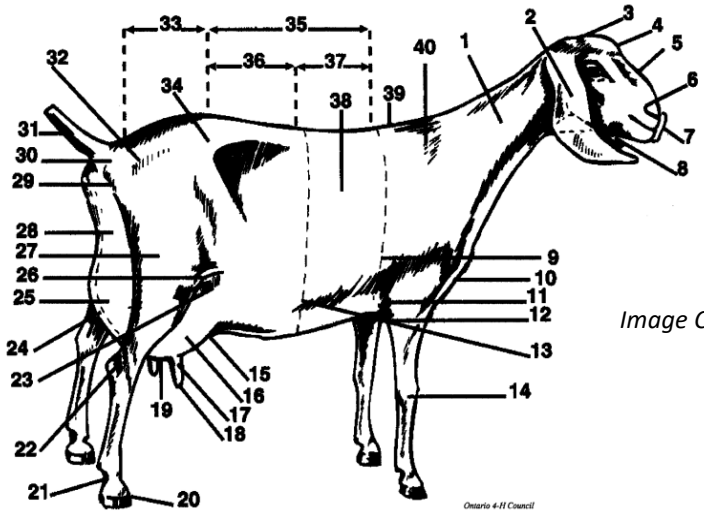


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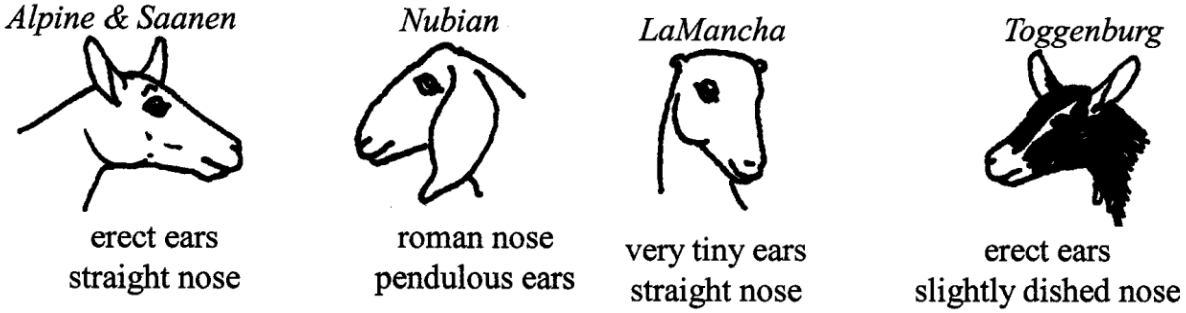
1. Neck
2. Ear
3. Poll
4. Forehead
5. Bridge of nose
6. Nostril
7. Muzzle
8. Jaw
9. Heart girth
10. Brisket
11. Point of elbow
12. Chest floor
13. Barrel
14. Knee
15. Fore udder attachment
16. Fore udder
17. Teat
18. Orifice
19. Floor of udder
20. Hoof
21. Pastern
22. Hock
23. Flank
24. Medial suspensory ligament
25. Rear udder
26. Stifle
27. Thigh
28. Rear udder attachment
29. Pin bone
30. Tail head
31. Tail
32. Thurl
33. Rump
34. Hip
35. Back
36. Loin
37. Chine
38. Rib
39. Withers
40. Shoulder blade

General Appearance

The general appearance of a goat includes its bone structure, breed character, colour, and the proportion of its parts in relation to one another. On the scorecard for a milking doe, general appearance is given 35 points out of a total of 100. On the buck scorecard, it is given 54 points. On the kid scorecard (junior doe), it is given 35 points out of a total of 65.

Breed Character and Colour

Goats should have the correct colour of hair and markings for their breed. The ears should also be the correct shape and carriage for the breed, usually erect or floppy.



Head

The head should be in good proportion to the body. The forehead and jaw should be wide and strong.

Shoulder Blades

The shoulder blades should be flat and blend smoothly into the body. They should be firmly muscled into the withers with no gap between the tops of the shoulder blades and the withers. The point of elbow should be quite close to the body. It should not point outwards from the body, which would indicate a winged or loose shoulder.

Back

The back is also referred to as the top line. It should be level, strong in the area of the chine, and not dip behind the withers. The loin should also be strong and level. It should blend well into the hip area, and the hipbones should not stick out far past the loin.

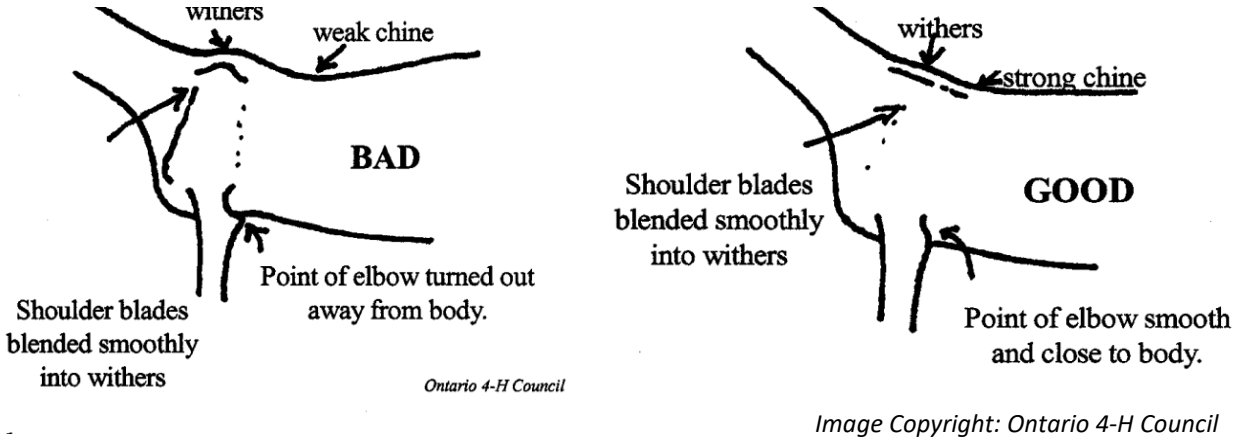
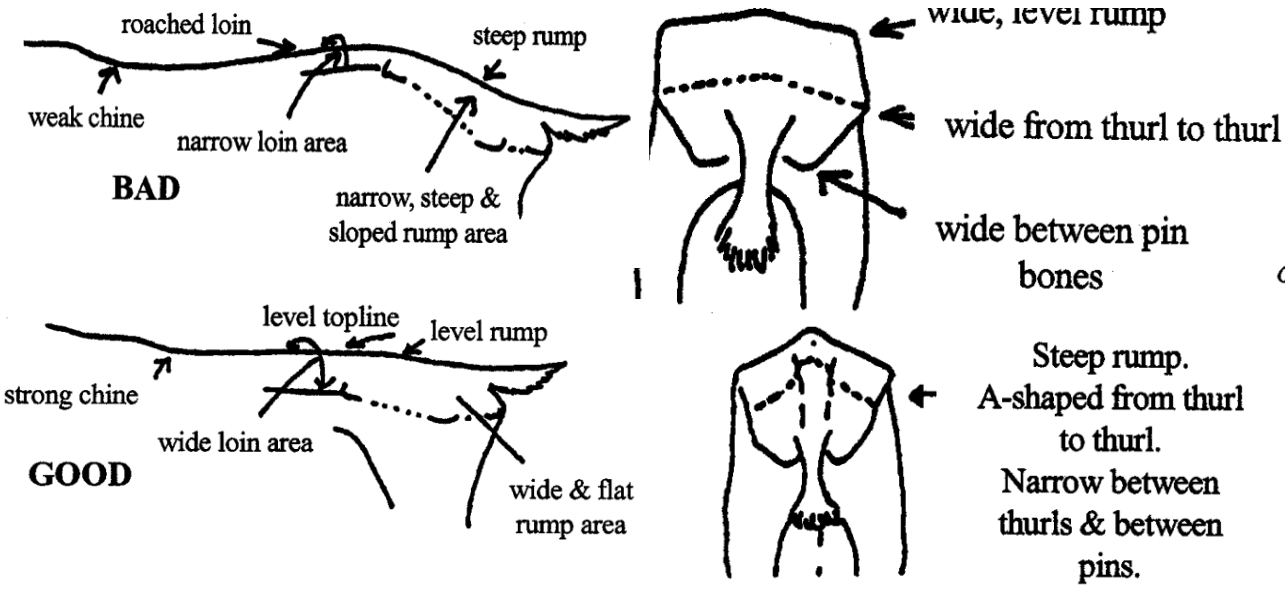


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Rump

When viewed from the side, the rump should be as level as possible from the hips to the pin bones. When viewed from behind, the backbone should be just slightly higher than the thurls. The rump area should be wide with lots of space between the pin bones. This indicates the goat has a wide stance and plenty of space for udder attachment. A goat with a narrow, steep rump usually has legs set too close together to allow proper space for the udder.



Feet and Legs

When viewed from the side, the front legs should be straight with no forward bend at the knee. The knees should not be swollen or heavily calloused, which can be an indication of arthritis. When viewed from the front, the front toes should point straight ahead and be close together. The cannon bones should be almost as long as the upper leg from the knee to the point of elbow.

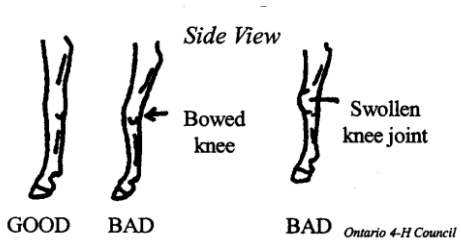


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The hind legs should be set well apart and the hocks should not turn inward toward each other when viewed from behind. There should be lots of room for the goat's udder. When viewed from the side, the hind legs should be properly angled. A vertical line from the pin bone to the ground should pass along the back of the hind leg.

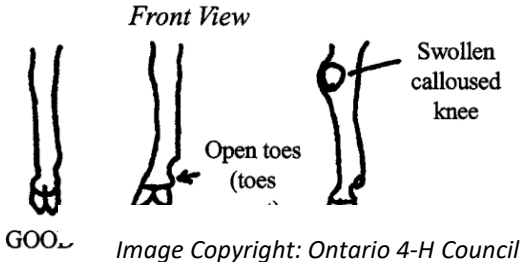


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Dairy Character

Dairy character includes all the traits that produce a good milking animal, such as angularity, general openness, and freedom from excess fleshing. These traits include the following:

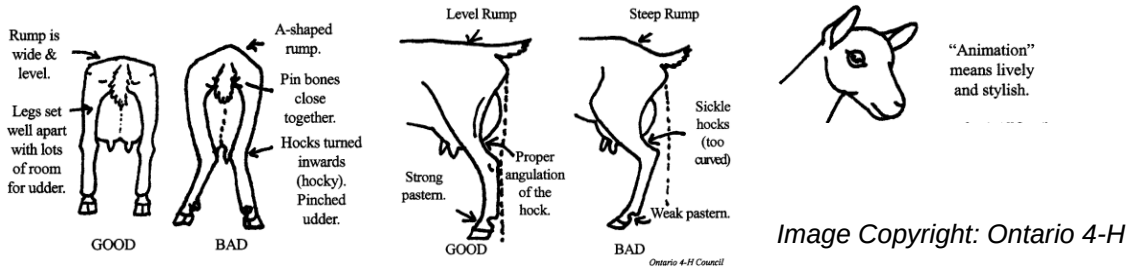


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Animation—A goat that has a certain "lively" or perky look. Animation adds stylishness to a goat.

Angularity—The general sharp bone structure of the goat is apparent. However, angularity does not mean that a goat is bony. All the parts of a goat seem to be in balance with one another.

General openness—All parts are well defined and cleanly boned.

Freedom from excess flesh—The goat carries adequate weight for its age, size, stage of lactation, etc., but without extra fleshiness over the back, ribs, and thighs. To help assess angularity, openness, and fleshiness, each part of the goat must be examined for indication of dairy character.

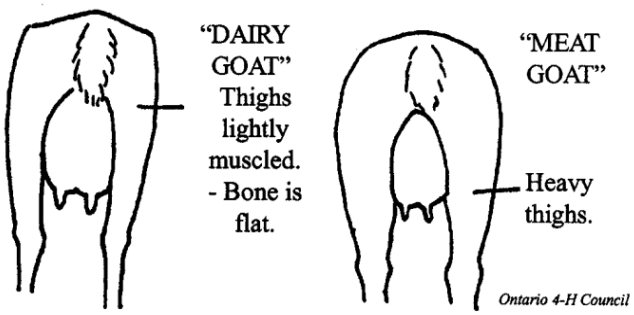
Neck—Should be long, graceful, and lean on a doe, but not as long or lean on a buck. The neck should not be too short or heavy.

Withers—They should be slightly higher than the shoulder blades, sharp, and like an inverted V. The shoulder blades should be firmly muscled to the withers without excess flesh. There should not be hollows between the withers and the shoulder blades, as this indicates poor shoulder muscles.

Ribs—The rib bones on a dairy animal should be wide and feel flat. You should be able to feel between the ribs, which indicates there is adequate spacing. Also, the ribs should be well sprung and long; this is a sign of good body capacity and gives the animal more depth in the barrel.

Image Copyright: Ontario 4-H

Thighs—When examining a goat from behind, the thigh should be lightly muscled without heavy fleshing. The thigh bone should also be gently curved to allow room for the udder. On a meat-type goat, the thigh should be more muscled.



Skin—On a dairy animal, the skin will be very fine and pliable. Gently pinch a fold of skin over the goat's ribs and roll it between your fingers. The skin on a good dairy goat will seem very thin and soft when rubbed between the fingers. The skin should also seem loose when you rub your hand on the back and neck.

Compare many goats to each other to learn how to recognize dairy character. When you see a good milker, look at it and keep these points in mind.

Mammary System

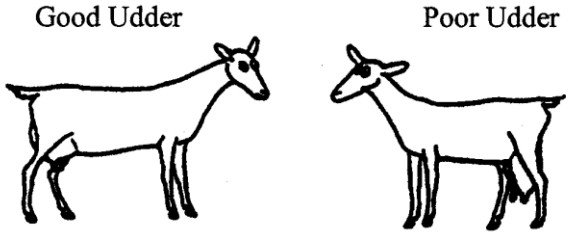
On a doe scorecard, the mammary system is worth a total of 35 points and is broken down into several categories with different point totals for each category.

- Medial suspensory ligament, shape, texture, and teat placement combined - 15 points
- Rear udder attachment - 8 points
- Fore udder attachment - 8 points
- Teats (size, shape, and placement on the udder) - 4 points

Capacity, Shape, and Texture

Is the udder proportionate to the goat's body size? Is it large enough for a goat that has freshened the number of times this one has? Is it the correct shape?

The udder should be soft to the touch, fine, and pliable. It should never be tough or leathery. The udder should feel soft inside with no hard areas from mastitis or injuries. The udder should not be meaty or filled with rubbery, fleshy tissue. After milking, the udder should collapse down.

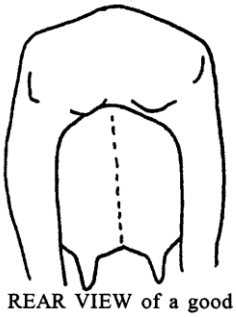


A good udder is globe-shaped, tightly attached to the body, and carried well above the ground.

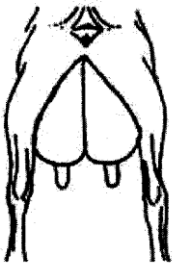
A poor udder is not globe-shaped, has poor attachment to the body, and may be too close to the ground.

Rear Udder Attachment and Balance of the Halves

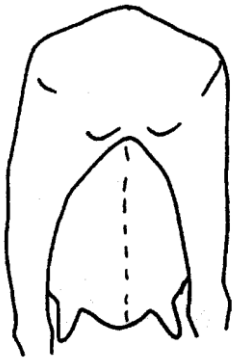
Is the udder high and wide at the back? It should smoothly blend into the body, slightly below the pin bones. Is the udder balanced? Are both halves the same size? The medial suspensory ligament that divides the two halves of the udder should be well defined and slightly lift the centre portion of the udder. When you look at the goat from behind, the udder should not be flat or bulge downwards between the teats. It should go up a little between the teats and the teats should point straight down and not out to the sides.



REAR VIEW of a good udder showing high, wide rear attachment. A strong medial suspensory ligament creates a good udder floor. Teats point straight down.



REAR VIEW of a poor udder with narrow and broken down rear attachment. Funnel-shaped teats.



REAR VIEW of a moderately attached udder. Poor medial suspensory ligament causes the udder floor to sag downwards and teats to point out to the sides.

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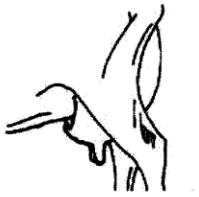
Image Copyright: Ontario 4-H Council

Fore Udder Attachment

Does the udder extend forward? There should be no large pocket or groove at the front of the udder when it is full of milk. The udder should be strongly attached at the front and sides and blend smoothly into the body just in front of the hind legs.



SIDE VIEW of a smoothly attached fore udder. Note how the udder blends smoothly into the lower abdomen. Teats are well placed and pointing down correctly.



SIDE VIEW of a poorly attached fore udder. Note how the front of the udder is broken away from the body of the goat. A large 'pocket' is visible in the front of the udder.

Ontario 4-H Council

Teats

The teats should be equal in size without being too large or long. When viewed from the side, the teats should be placed on the udder so they are just slightly ahead of the hind legs. When viewed from behind, the teats should be set wide apart and point directly down, not out to the sides.

Body Capacity

Body capacity is judged by the size of the goat's body in relation to the overall size of the animal. A goat with large body capacity would be expected to eat more food, digest the food better, and be more productive. It would also have more room for its heart and lungs and be a healthier animal overall.

There are two areas to look at when evaluating body capacity:

1. **The barrel**—The area covered by the ribs, which contains the abdomen. When you look at the goat from above, the barrel should be nice and round. Keep in mind that the size of the barrel can change depending on how much food the goat has recently consumed. However, the ribs should round out well from the top line regardless of when the goat last ate. When you look at the goat from the side, the body just ahead of the hind legs should appear to be deeper than the body just behind the front legs, this is called "wedge shaped."

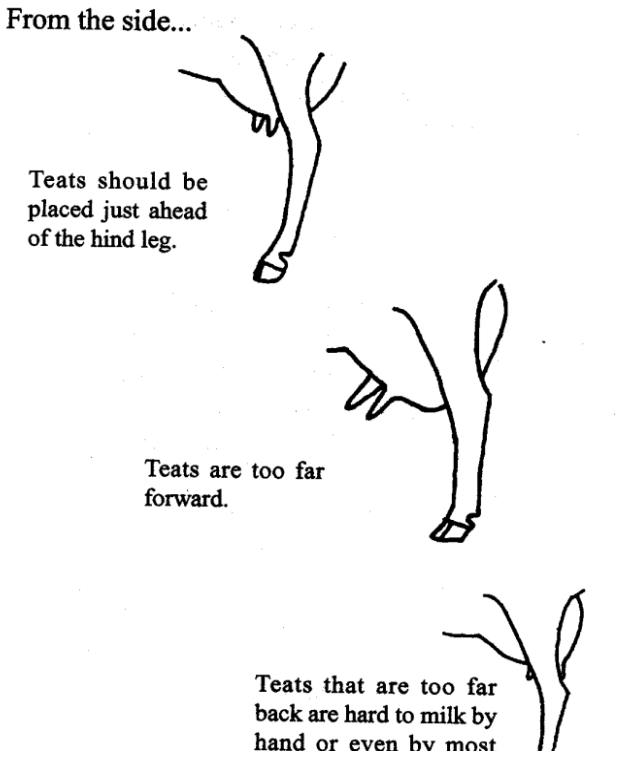
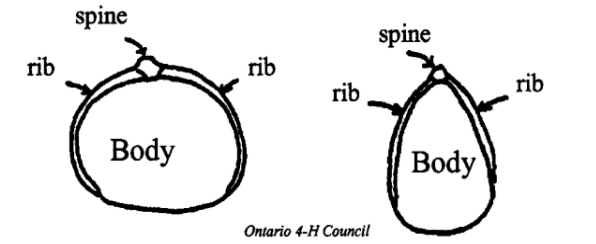


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Good 'spring of rib'. Ribs are long, wide and flat. They 'spring' outwards from the spine. This results in good body capacity.

Poor 'spring of rib'. Ribs are short, narrow, and rounded. They do not spring outwards from the spine. This results in poor body capacity.

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2. **The heart girth**—This usually refers to the circumference of the animal measured just behind the withers.

   The heart girth should be large with lots of room for the lungs and heart. When the goat is examined from the front, the chest floor should be wide and the front legs should not appear to pinch together at the chest. The area between the base of the neck and the bottom of the brisket should be very deep. When you look at the goat from the side, the brisket should extend well out in front of the front legs.

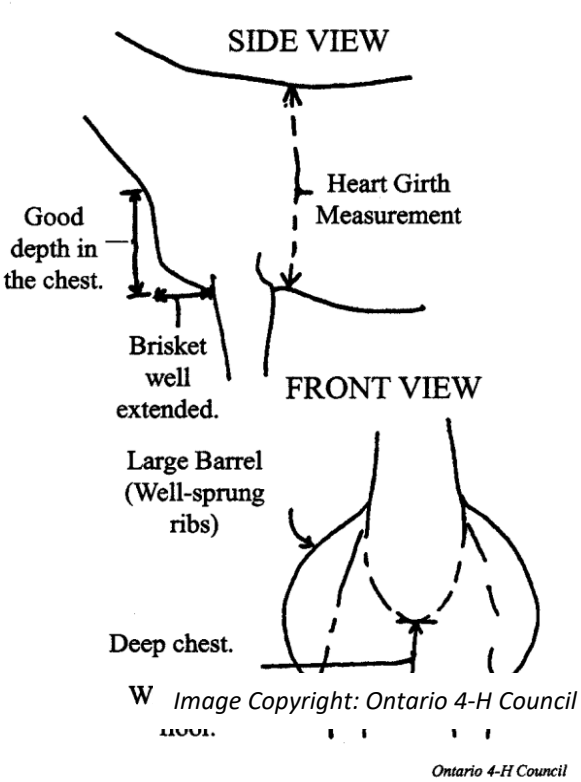


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NOTE

To view full and complete scorecards for goats, see the link listed under Additional Resources at the end of this manual.

Section 2: Care and Management

Code of Practice

The National Farm Animal Care Council has developed a *Code of Practice for the Care and Handling of Goats* that outlines proper care and handling techniques for this animal. The code contains recommendations for housing and management practices, as well as transportation and processing. You can find the code of practice at http://www.nfacc.ca/codes-of-practice/goats.

Canada's codes of practice are nationally developed guidelines that serve as the foundation for ensuring farm animals are looked after using sound management and welfare practices that promote animal health and well-being. Codes are used as educational tools, reference materials for regulations, and the foundation for industry animal-care assessment programs. The codes aim to provide feasible and scientifically informed approaches to meeting an animal's health and welfare needs, contributing to a sustainable and internationally competitive farming industry.

The management provided by the person(s) responsible for the daily care of animals has a significant influence on the animals' welfare. Those responsible should consider the following key aspects of responsible care:

- Shelter and comfort
- Feed and water to maintain health
- Social needs
- Humane handling
- Disease prevention and control
- Veterinary care, diagnosis, and treatment
- Timely euthanasia of any animal that is not responding to treatment or is experiencing pain that is not relievable
- Emergency preparedness

Housing

Most goat farmers allow an area of at least 2.3 m^2 (25 ft^2.) for each adult goat and 1.4 to 1.9 m^2 (15 to 20 ft^2.) for each young goat. Overcrowding is stressful for a goat and can lead to fighting and facilitate the spread of disease. Ensure your goats have enough space to prevent any issues.

Types of Housing

Loose Housing

This is the most common type of housing due to labour and resource efficiencies. It also allows goats to freely socialize in their environment.

Advantages of loose housing:

- Goats are free to wander.
- Goats can get more exercise.

- Goats can easily socialize.
- Feeders and waterers can be quickly filled.
- Pens can be set up for cleaning with a tractor and loader.
- Requires few dividers, so there is minimal cost and time spent setting up.

Disadvantages of loose housing:

- Aggressive goats can bully shy goats.
- Goats do not usually receive individual attention.
- You cannot adjust feed for individual needs

Individual Stalls

Goats are housed in individual stalls and can be turned out together for exercise. Individual stalls should be about 1.2 m (4 ft.) wide and 1.5 m (5 ft.) long for adult goats. Stalls should be a minimum of 1.2 m (4 ft.) tall to prevent goats from jumping out. Slats of stall dividers should be vertical rather than horizontal to discourage goats from standing on the partitions. Stall doors should swing outwards, otherwise bedding can become piled up against the doors and make it difficult to open them. All latches should be “goat-proof.” Use a heavy, sliding latch to fasten any doors so they can’t be opened by the goat.

Advantages of individuals stalls:

- Goats usually receive more individual attention.
- Goats can be fed individually.
- Goats do not have to compete for food or living space.

Disadvantages of individual stalls:

- Goats must be let out for exercise.
- There is not as much opportunity for socialization.
- Feeders and waterers must be individually filled, requiring more labour.
- Stalls are usually cleaned out by hand with a pitchfork and wheelbarrow.
- Individual stalls require more dividers, doors, feeders, and waterers, so the cost and time to build is greater compared to loose housing.

Stall Floors

The best type of floor for a goat stall is an earth floor covered with clean sand. This provides a good base and sufficient drainage. An earth floor is usually warmer than concrete flooring, which traps dampness and odours. Wooden floors are not usually desirable because wood tends to rot.

Concrete is best used in aisles, milk rooms, and feed rooms because feed carts and wheelbarrows can be easily pushed across it. Also, concrete is rodent proof and it can be washed down and disinfected. Any room that will be washed down, such as the milk room, should be sloped and have some type of drain installed beneath.

Stalls for Bucks

Bucks should be housed separately from does. During breeding season, bucks will try to escape from their stalls. A buck can easily damage partition walls, so think strong! Stalls should be made out of welded steel, strong planking, or thick plywood. Buck stalls should be at least 2.4 m x 1.5 m (8 ft. x 5 ft.)

Stalls for Pregnant Does

Pregnant does that are close to giving birth should be kept in a kidding pen. These pens should be 1.8 m x 2.4 m (6 ft. x 8 ft.) and be kept sanitary to protect the kids and doe from disease. Whitewashing pens and walls helps maintain sanitary conditions.

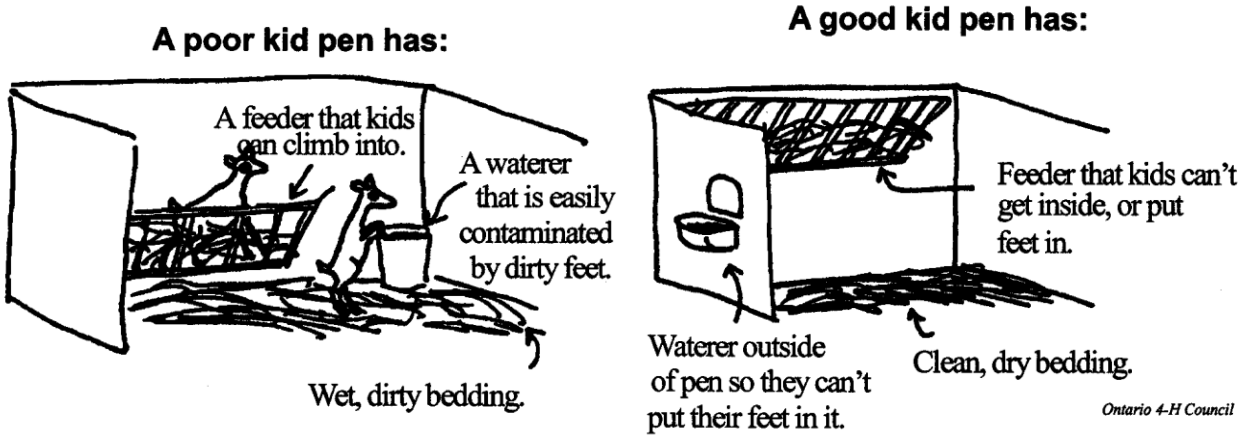


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Kid Housing

A 1.2 m x 1.2 m (4 ft. x 4 ft.) pen should provide enough room for four kids at two weeks of age. By the time the kids reach four months of age, their pens should be 1.5 m^2 (15 ft^2). However, the size could be reduced if they have access to an outdoor yard. It's a good idea to have no more than five kids per pen for management purposes. It is especially important for kids' stalls to be kept clean. Kids tend to soil bedding often and many diseases can occur when kids are in damp, unsanitary conditions.

Feeders and Waterers

Feeders and waterers should be placed off the ground so it is difficult for goats to climb into or onto them. This is a safety measure, minimizes food waste, and prevents goats from contaminating their food and water. Feeders should be 38 to 46 cm (15 to 18 in.) for does and 20 to 25 cm (8 to 10 in.) for kids. Be sure to provide lots of feeder space so less-aggressive goats can always access feed and water.

Goats require lots of clean water, especially milking does. Some ways to provide clean water include the following:

- **Waterers with a step—**A cement pad can be placed around the base of the waterer in loose housing. This provides goats with a clean place to put their feet while drinking and makes it difficult for the goat to place their feet inside the waterer.
- **Locate waterer outside of pen**—Sometimes a waterer can be located outside of the goat pen. The goats can put their heads out to drink, but they cannot get their feet into the waterer.

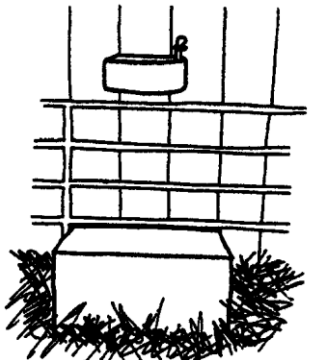


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All waterers should be

- checked at least once a day to make sure they're clean and working properly (if automatic)
- located away from feeders where chaff, grain, or hay could fall into the water
- located at the low end of the barn to reduce dampness from spillage
- raised high enough to prevent contamination from manure and urine
- thoroughly cleaned and scrubbed often
- small enough that kids cannot drown in them; do not use 20 liter pails in a kidding pen

Ventilation

Ventilation is the process of intentionally letting fresh outside air into an indoor space to control the air quality. Air quality is regulated by diluting and displacing pollutants such as dust, odours, or gases. Dust from grain, hay, and dried manure floats around in barns; this can cause respiratory problems and worsen allergies. It is important to be careful around enclosed areas containing manure as gases from the manure can kill people and animals.

Along with air quality, ventilation can also control the temperature and humidity to make the space more comfortable for you and your animal. Humidity is moisture in the air. Too much of it can cause your animals' housing to become damp, which may result in sick goats. Goats are better off cool and dry versus warm and damp. Humidity can also be damaging to milking equipment and machinery. Goats naturally give off heat and moisture, so you need to make sure there is adequate ventilation to let excess heat and moisture escape the barn. Ideally, humidity levels in the barn should stay under 75 to 80 per cent.

Handling

Goats need to be handled for breeding, movement, veterinary care, shipping, milking, and other related activities. It is important that goats are familiar with you so handling is less stressful for both you and the animal.

Tips for handling your goat:

- Work calmly and consistently around goats.
- When catching a goat, use one arm around its neck and the other around its hindquarters.
- Move and guide goats by using one hand to grasp under their jaw and use the other hand to hold the back of their head.
- When carrying kids, lift their chest and abdomen and carry them horizontally.
- Never pick up a goat by its horn, neck, or legs.
- When moving a group of goats, encourage them to walk by standing in their flight zone just off to the side of their hindquarters. Do not use sticks or canes to prod the goat, nor should you bang on equipment to scare them into place.

Transportation

Goats may need to be transported when they are bought or sold or being bred or slaughtered. Proper preparation for moving goats reduces stress and risk of physical injury. Finished goats being shipped directly for processing have been carefully raised to ensure the best quality meat for processors and consumers. How goat meat is prepared, handled, and shipped to market is important to maintain meat quality after processing. Processors may require advanced notification of a shipment and a statement of any medication used along with withdrawal times. The following are best transportation practices:

Perform a transport fitness assessment of all goats. Any goats that do not pass this exam should not be transported. For more information on fitness assessment, reference the goat code of practice.

- Allow goats to have access to water and feed up to the time of loading to reduce weight loss and meat shrinkage during handling and transport. Ensure the total transportation time without feed or water does not exceed 48 hours, including the period between transportation and slaughter.
- Provide bedding for the floor of the transport vehicle for absorption and to prevent slipping.
- Ensure the goats have adequate ventilation and protection from the elements inside the transportation vehicle.
- Do not transport live goats in the trunk of a car.
- Ensure all animals being transported are evenly distributed and there is no weight imbalance.
- Segregate animals based on size, gender, age, and temperament.

NOTE

For more information on handling goats and transportation, view the link for the National Farm Animal Care Council *Codes of Practice for the Care and Handling of Goats* as well as *Code of Practice for Transportation* provided under the Additional Resources section at the end of this manual.

Dehorning and Disbudding

Dehorning is advisable for all dairy breeds because

- it prevents injuries to other animals in the herd
- dehorned animals are safer to work with

Disbudding your kids shortly after birth is the quickest and surest way of getting a neat and complete dehorning. Disbudding is done with an electric dehorning iron, which should have a 1.9–2.5 cm (3/4–1 in.) tip on it. You should never use disbudding pastes or caustic sticks as they can cause blindness and burn the dam's udder.

The following procedure is recommended for disbudding:

1. **Check for horns**—Begin checking the kid for horns following birth. If the skin moves freely over the horn bud, the kid is hornless. If the skin is tight against the head, and if the horn button can be felt, it is time to dehorn.

2. **Restrain kid**—Halter and restrain the kid as humanely as possible, keeping the ears out of the way.

3. **Clip the hair**—While the dehorning iron is heating, clip the hair around the horn bud.

4. **Test the heat of the dehorning iron**—You know it is ready when it quickly burns a dark ring on a piece of wood.



5. **Move the disbudding iron**—Move the handle of the iron in a circle on the horn bud until a copper-coloured ring forms around the base. This takes approximately 8-12 seconds.

6. **Make crisscross marks**—Make the marks across the exposed areas to keep scars from forming.

7. **Sanitize**—Spray the affected area with a commercial spray to prevent infection.

Traceability

In Nova Scotia, goats fall under the Nova Scotia Premises Identification (PID) program. Farmers should apply for a PID number. A PID number is a unique number, based on national standards, that is assigned to a premise. Each premise will be issued a single premises identification number, regardless of the number of animal types or premise types on that parcel of land. Either the owner or renter of a land location may apply for a PID for a location. Land ownership must be indicated on the application.

A premise is defined as a parcel of legal land where animals are grown, kept, assembled, or disposed of. Premises include farms, hobby farms, stables, feedlots, pastures, hatcheries, egg-grading stations, abattoirs, assembly yards, auctions, sale facilities, rendering plants, zoos, petting farms, fair grounds, racetracks, competition facilities, veterinary facilities, etc.

Benefits of the PID program include the ability to

- notify premise owners of disease outbreaks in their vicinity and recommend biosecurity precautions
- determine which species are near a disease outbreak
- respond in a rapid and informed manner when emergencies occur
- address all phases of emergency management (preparedness, prevention, response, and recovery)
- reduce the impact of marketing restrictions by enabling quicker resolution of emergency situations

You can find the application form to apply for a PID on the website listed under Additional Resources at the end of this manual, by calling 902-890-3377, or by emailing NSPID@novascotia.ca.

NOTE

For more information on traceability, see the information sheet in the Appendix at the end of this manual.

Identification:

All goats should be identified and recorded soon after their birth using ear tags, leg bands, neck chains, collars, or other means. All goats with registration papers must be legibly tattooed. This tattoo is a form of identification and will match a goat's papers.

Goats are tattooed in their right ear with the registered herd letters of the farm where they were born. The goat's left ear will have an identifying number and the letter designated for the year it was born. For example, all goats born in 2018 would have a "K" tattooed in their left ear and goats born in 2019 would have an "L" etc. For breeds without ear cartilage, the tattoo is placed in the tail web.

The following is the procedure for tattooing:



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1. Safely restrain the animal.
2. Put the correct symbols in the tattoo pliers.
3. Punch a piece of paper first to be sure the information is correct; then punch the bottom of the application for registration so you have a permanent record.
4. Cleanse and disinfect the ear with alcohol.
5. Using a toothbrush, smear green ink on the skin midway between the veins and cartilage of the ear.
6. Line the symbols up parallel to the veins or cartilage. Squeeze the pliers together with a quick, firm movement.
7. Using the toothbrush again, immediately apply more ink for at least one minute to make sure the ink penetrates the skin. If any blood appears, reapply ink. Do not remove excess ink.
8. Clean the rubber pad and needles with alcohol.

Goat producers should make an effort to stay current with national policy changes with regard to traceability regulations. It is anticipated goats will be required to be tagged with official tags and have their movements reported in the future.

Section 3: Nutrition

What is a Ruminant?

Goats are ruminant animals, meaning they have a special stomach with four compartments. This stomach allows them to eat grass hay, leaves, and branches that animals with simpler digestive systems are not able to eat. Goats enjoy eating tough, fibrous plants more than other ruminants, which is why goats can survive in areas that are not suitable for other livestock. The goat's digestive system works as follows:

Mouth—Ingests food and chews it into smaller particles. Saliva mixes with the food and begins the digestive process.

Esophagus—Moves the food from the mouth to the stomach by muscle contractions.

Rumen—This is the largest part of the stomach and the first of the four chambers of the stomach. Ruminant animals digest cellulose found in roughage by using microbes contained in their rumen. These microbes help to break down food into vitamins, proteins, minerals, and carbohydrates.

Reticulum—Forms the cud, which is a ball of food, and regurgitates it back into the mouth for chewing. The goat will eventually swallow the cud, which will re-enter the stomach. The reticulum is the second chamber in the stomach.

Omasum—Extracts and absorbs fluids out of the food. The omasum is the third stomach and is often referred to as the bible because its surfaces looks like the edges of the pages of a large book.

Abomasum—Contains digestive juices to further break down the food. It is the fourth chamber and is most similar to a human's stomach. In young goats, this stomach does most of the work when kids are drinking large quantities of milk. A special passage called the esophageal groove closes off the other stomachs so milk directly enters the abomasum.

Small intestine—Where most of the fluid is absorbed and where the greatest amount of nutrient extraction takes place.

Cecum—Located between the small and large intestine, it contains more micro-organisms that further digest food.

Large intestine—Absorbs water and adds mucous to the remaining material to help it continue through the digestive system.

Essential Nutrients

Nutrition is the process through which goats turn food into energy. Proper nutrition is important for growth, maintenance, reproduction, milk production, and fattening. It is important to know the nutritional requirements for each developmental stage of a goat's life.

The primary food nutrients required by all animals are classified as follows:

- **Protein**—Used for growth and development of glands, muscles, hide, horn, and hair. It is also used to repair body tissues and to produce milk. Protein comes from legume hays, such as alfalfa and clover, soybean meal, immature grasses, skim milk, wheat bran, oats, and byproduct feed.
- **Carbohydrates**—Used for energy in body functions, growth, and milk production. Carbohydrates can be found in grains, such as oats, barley, wheat, and corn, as well as molasses, hay, silage, and pasture.
- **Fat**—Used for energy and fattening. It can be found in flax seed, soybean meal, and grain in small quantities.

Secondary nutrient classes consist of minerals and vitamins. Water and air are other essential nutrients but they are obtained from sources other than food.

Minerals—Used to build an animal's skeleton and an essential part of enzymes and hormones. Minerals can be found in trace mineralized salt, dicalcium phosphate, calcium, legume hays, as well as phosphorus in grains and oil meals.

Vitamins—Used for growth, vitamins aid in digestion, blood clotting, muscle and tissue structure, intercellular substances; they also increase resistance to infections. Various foods are good sources of different vitamins:

- Vitamin A: Green, leafy forages and yellow corn
- Vitamin B: Produced by bacteria in the rumen
- Vitamin C: Produced in the digestive tract
- Vitamin D: From sunlight, fish oils, and irradiated yeast
- Vitamin E: Grains

Water—Vital for all processes of the body, such as digestion, removal of wastes, regulation of body temperature, and disease prevention. Most of the contents in the digestive system are water. Food that is eaten is mixed with water so it can move through the digestive system easily. Water also forms a large percentage of blood and body tissues in a goat. Goat milk is composed of approximately 90 per cent water, so a milking doe needs water in order to make large quantities of milk.

Classes of Feed

Concentrate Feeds

Concentrate feeds include farm grains, mill feeds, and manufactured supplements. Some of the most common concentrates are oats, barley, wheat, wheat bran, shorts, corn, molasses, dried beet pulp, pea meal, cottonseed meal, and soybean meal. These feeds are low in fibre and high in digestible nutrients. They are able to supply large quantities of energy that an animal can use quickly. A 14 or 16 per cent protein concentrate ration is suitable for feeding to goats.

Dry Roughage

Dry roughage includes feeds such as hay and straw. Dry roughage is high in fibre but low in digestible nutrients. If fed on its own, dry roughage is required in large quantities to sustain an animal's life. Goats are ruminants, so their stomachs are specifically designed to break down

roughage. Dry roughage used for goat feed includes alfalfa and clover hays, which are high in protein, as well as mixed hay, timothy hay, meadow hay, and grain hay.

These hays all considerably differ in their protein, carbohydrates, mineral, and fibre content. Also, early-cut or immature grasses and legumes may contain as much as twice the nutrient percentage as late-cut, mature plants.

Forages

Succulent feeds are any feed that is fed in the green or preserved stage, for example, silage or green grass. Corn silage can be used as a winter feed or as a supplement when summer pastures are scarce. Green silage is made from grass, legumes, green cereals, or any combination of these. It is slightly lower in carbohydrate and considerably higher in protein than corn silage. Green feed, both legume and grass, is the most economical feed for livestock. It is highly nutritious, palatable, and supplies many of the essential nutrients necessary for health and growth. However, it can impart an unpleasant flavour in goat's milk.

The Importance of Forage for Goats

The goat's digestive system works best on a high-fibre diet. For this reason, farmers feed forage crops, most commonly hay and pasture.

Good quality hay is key for goats, as it is palatable and high in nutrients. It is important to know how to judge hay so you can choose hay that is best suited for your animals. If goats are growing, pregnant, or producing milk or mohair, they may not receive enough nutrients from hay alone. The goat's diet may need to be supplemented with grain to provide more energy. The amount of grain you will have to feed your goat depends on the quality of hay. Hay quality is judged using several different methods.

1. **Appearance**
   - Is the hay nice and green, or is it bleached out or black?
   - When was the hay cut? Was it young, mature, or over ripe with just the stalks remaining?
   - Does the hay have the desired combination of grasses and legumes?
   - Is it full of weeds?
   - Is there mould in the bales?

2. **Odour**
   - Does the hay smell fresh, like newly cut grass? Or does the hay smell mouldy, musty, or dusty?

3. **Feel**
   - Does the hay feel soft and tender? Or is it sharp and tough feeling?

4. **Forage Analysis**
   - A sample of hay can be taken and sent off to a certified lab for analysis. Grain rations can also be analyzed in the same way. Knowing the exact nutrient content of your hay helps to determine how much grain and minerals are required to meet the goat's nutritional needs.

- The Nova Scotia Department of Agriculture Analytical Lab is based in Bible Hill and can be reached at 902-893-7444.

Pasture

One of the most economical ways to raise your goats is on pasture. Goats enjoy browsing; this means they like to walk around nibbling leaves and branches, flowers, tree bark, and other plants. For this reason, marginal land that is of too poor quality to cultivate and seed with crops can be used for grazing goats.

Pasture Management

Pasture management means you are providing good quality food for your goats while looking after the plants that produce the food. In a well-managed pasture

- the forage plants are tasty and interesting to the animal
- the type of plants grown provides good nutrition for the animals
- the field is the right size for the number of goats
- the fencing is safe, durable, and keeps the goats contained
- the pasture has a shelter that protects the goats from the elements

How to Manage a Pasture

- Pasture lands should be divided up into proper-size fields for your herd to prevent overgrazing and to ensure the goats have enough space. Electric fences are often used for separation.
- For optimum pasture growth, it is best if animals are only allowed to graze for three to four days in a paddock and then moved to another pasture. Each paddock should be rested for approximately 30 days before animals return to graze it. It is important to know when animals are beginning to over-graze a field. Make sure enough leaves remain for the plant to continue growing well. Do not turn goats out onto a pasture until it is about 15 cm (5.9 in.) tall.
- If pasture is growing faster than your herd can eat it, consider harvesting some of the pasture for winter feed and grazing the regrowth.
- Make sure the pastures are well fertilized so they will grow back well each year.

NOTE

For more information on pasture management and fencing, see the "*Introduction to Livestock*" link as well as the "*Livestock Fencing Guidelines*" and *"Maritime Pasture Manual"* links under the Additional Resources section at the end of this manual.

Feeding Program

Goats should be supplied with the following so they will be at their healthiest:

- Clean water

- High-quality free choice hay
- A loose mineral box and/or a trace mineral salt lick
- Grain to supplement and support the goat at different stages of its life

It is highly recommended you consult a nutritionist or an experienced producer to ensure you are feeding your goats a balanced diet.

Dairy Kids

Kids born to dairy goats are typically separated from their dams at birth and are hand reared. Bottle-raised kids are much easier to handle. Also, bottle feeding gives you the opportunity to raise your kids on a caprine arthritis encephalitis (CAE) prevention program, which is accomplished by feeding heat-treated colostrum and pasteurized milk. Kids should be fed colostrum immediately after birth as colostrum contains antibodies that help kids' develop their immune systems. To feed colostrum, follow these steps:

1. Collect colostrum in a sanitary manner. Wash and dry teats before collection, wear gloves, and use clean containers to store the milk.
2. Ensure the colostrum given to kids is from CAE-free does or is heat treated. Colostrum should be heat treated at 56°C/132.8°F for one hour.
3. Feed colostrum following collection. Colostrum can be stored in a refrigerator for 48 hours or it can be frozen and used at a later date.
4. Kids must receive 50 ml (1.75 oz.) of colostrum per 1 kg (2.2 lb.) of body weight four times a day during the first 24 hours of life.

After the kid has receive colostrum, they can be fed milk or milk replacer by a bottle. Bottle-fed kids should be fed four or five times a day during the first two weeks of life. After that, they can be fed two or three times a day until they are weaned.

Weaned Kids

Kids are weaned around three months of age and should receive approximately 1–2 kg (2.2–4.4 lbs.) of grain per day. Between weaning and seven months of age, kids require 12 per cent protein. This can be decreased to 9 per cent protein from seven months to one year old.

Bred Does

You can gradually increase your young pregnant doe's grain ration by 1 kg (2.2 lb.) per day during the last five weeks of gestation. However, the actual amount of grain fed should be based on the nutrient content of hay. If you think a young goat is carrying twins or even triplets, the doe may require even more grain.

Dry Does

Grain ration should be cut back before the doe is dried off. Once a doe is dried off, it may not need a concentrate if it has access to good pasture. If the pasture is poor, or none is available, concentrate may be fed. When dry, goats require 9 per cent protein.

Milking Does

To milk well, does must be fed well. Rations should have a protein content between 12 and 16 per cent, depending on their milk production and the amount of protein in their hay. A good rule is to feed 1.5 kg

(3.3 lbs.) of grain for each 3 kg (6.6 lbs.) of daily milk production. For low-producing does, provide a daily minimum of .75kg (1.6 lbs.)

The Heavy Milker

A goat that gives over 5 L (1 gal.) of milk a day is considered a heavy milker. Many of these heavy producers will rapidly lose weight if you do not feed them adequately. You need to increase their grain ration to keep up with their production. To keep the goat's appetite strong, make sure the amount of hay consumed never goes below 40 per cent of the total weight of grain and hay combined. This also ensures that weight loss associated with early lactation will be gradual and remain at an acceptable level.

When feeding heavy milkers, the produced milk is often weighed each day. The amount of grain is raised until the milk production does not increase in response to the extra grain. The grain can then be cut back a little while watching for any drop in production, and the grain increased again if necessary.

Bucks and Wethers

Often mature bucks can meet their nutritional requirements on good-quality grass or mixed hay alone. If they are fed alfalfa hay, limit it to 1 kg (2.2 lbs.) a day to avoid high levels of calcium in their diet, which can lead to arthritis. Keep the calcium-to-phosphorus ratio between 2:1 or 3:1. For bucks and wethers that need more fat and muscle on them, feed a supplement that has about 30 per cent fat and 16 per cent protein. Young bucks should receive 2 kg (4.4 lbs.) of dairy ration per day. Older bucks should receive a 1/4 to ½ kg (.55 to 1.1 lbs.) of ration per day. During the breeding season, it is important to increase the grain a little, approximately .25kg (.55 lbs.).

The Meat Herd

Meat-goat kids are typically raised with their does. They will nurse until they are weaned and should be provided with solid food, such as pellets, forage, or grain. When the kids reach market weight (usually two or three months of age), they are removed from the doe. The doe's grain should be gradually reduced until she is dried off.

Body Condition Scoring

Throughout your herd's lifetime, their nutritional requirements can change greatly depending on their stage of development, pasture quality, time of year, or whether they are breeding or not. It is important to routinely examine your herd to ensure they are in optimal condition so you can adjust their feed intake according. Does should be examined in the fall prior to flushing so there is enough time for the doe to adjust to its new diet and increase its body condition score for breeding. Does should be scored again at mid-gestation and just before kidding as well, so they can be in optimal condition for lactation.

Steps for Body Condition Scoring

1. Feel the spine in the centre of the goat's back, behind the last rib, and in front of the hips.
2. Feel the tips of the transverse process.
3. Feel for fullness and fat cover.

Score of 1—Extremely Lean

You can easily feel the individual vertebrae of the spine. There is no muscle or fat covering the bones. Ensure the animal is receiving proper nutrition and doesn't have any other serious health issues.

Score of 2—Lean

Individual bones can be felt, but they are rounded and not sharp. There is some muscle covering the bones but it feels concave. Before breeding or kidding, a doe's nutritional intake needs to be increased so it can reach a score of 3.

Score of 3—Good Condition

Using firm pressure, you can feel the ends of the transverse processes of the vertebrae. The goat has full muscle with some fat covering the bones. The fat should feel convex. This body condition is good; however, it is recommended to flush and raise the nutritional intake before breeding.

Score of 4—Fat

It is not possible to detect the ends of bones but their position can be determined by using firm pressure. The goat has a thick covering of fat over the muscles and vertebrae. Fat deposits are visible over the head of the tail and brisket. A goat in this condition usually does not need to be flushed before breeding.

Score of 5—Obese

The goat has a thick layer of fat over the loin. The tips of the spinous processes can't be felt underneath the fat and there is a depression where the spine would normally be felt. Goats in this condition are overly fat and may have health problems. You should increase their exercise and adjust their nutrient intake.

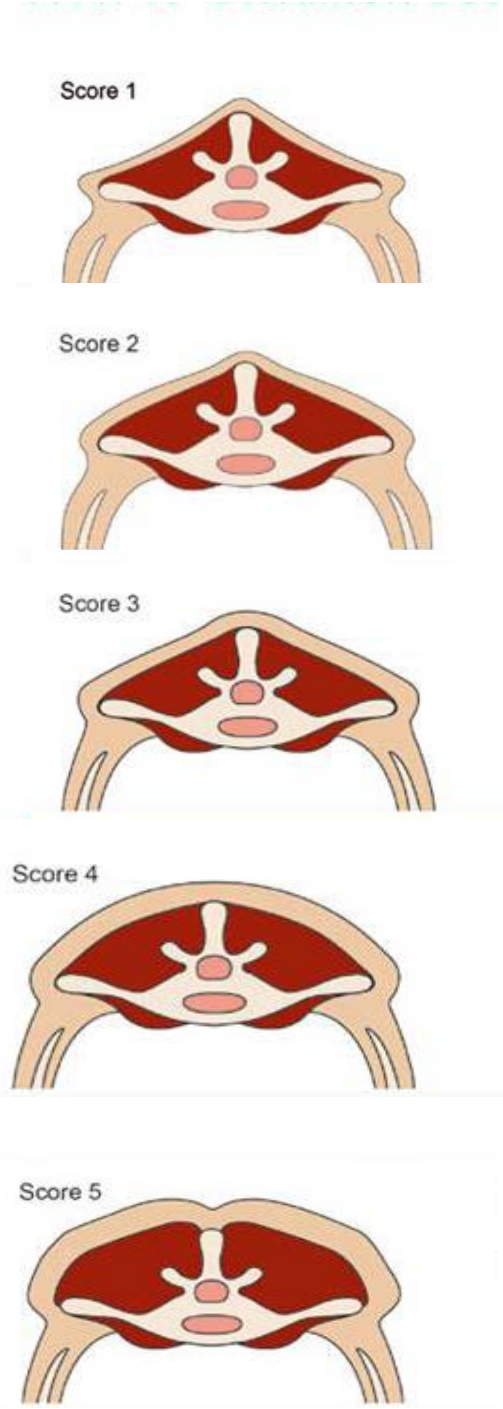


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Section 4: Health

Recognizing a Healthy Animal

It is important to know the signs of a healthy goat so you can recognize when a goat may not be feeling well and address the issue immediately. The best way to detect disease is by spending a little time each day watching your goats. Here are some of the things you should watch for.

Healthy Signs	Sick Signs
Respiration rate: 15 to 30 breaths per minute	Out of range
Pulse: 60 to 80 beats per minute	Out of range
Rectal temperature: 38.6 to 40°C (101–104°F)	Out of range
Goat looks bright and alert	Goat appears dull or distressed
Nose, mouth, and eyes are clean	Nose, mouth, or eyes are dribbling or have discharge
Ears are in their normal position	Ears that are normally pricked are drooping
Coat is healthy, shiny, and smooth	Coat is dull, hair is falling out, or shows signs of skin irritation
Skin is supple	Skin is tight
Goat has good body condition	Goat is too fat or too thin
Feces is normal pellets	Feces is lumpy, runny, or mucus covered
Appetite is good	Goat is not eating
Udder is soft and even	Udder is hard, lumpy, or has abnormal milk
Legs are clean	The joints are hot or swollen

Biosecurity

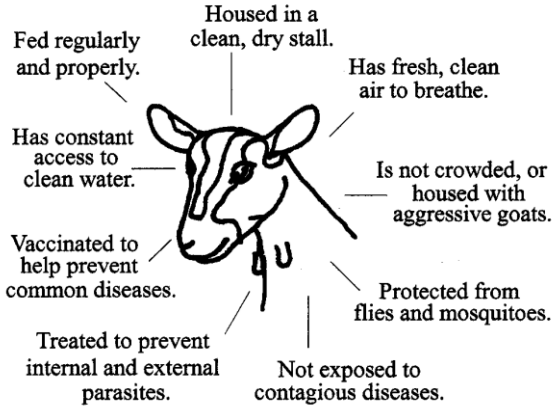
When raising goats, it is important to practise good biosecurity as the potential for disease outbreak can pose serious threats to your goats' overall health and longevity. Biosecurity is a system of best management practices that are put in place to reduce the introduction of disease. Biosecurity implementation could include screening measures for new or returning visitors/animals/equipment and/or creating an area of isolation for new/sick animals. There are three main sources for health threats to a farm:

1. Physical transfer from visitors

2. Biological transfer from new, sick, or contaminated animals
3. Transfer from equipment, supplies, or machinery

A good farm operator will take several steps to prevent the transmission of contagious diseases. These steps are:

1. **Isolation**—Prevent close contact between sick animals, newly purchased animals, and animals that have been away at a show.
   - Sick animals should be housed in a separate section of the barn, away from all other animals. If an animal dies, immediately remove the dead carcass and thoroughly disinfect its pen. If possible, leave the pen unoccupied for three to four weeks. Feed and handle sick animals last. Have dead livestock checked by a veterinarian or sent to a pathology lab for analysis if you are not completely sure of the cause of death.
   - Newly purchased animals should be kept separate for three to four weeks and watched carefully for signs of disease.
   - If you compete in a lot of shows, you might want to keep a small separate area to house frequently shown animals. Look after the animals that stay at home first before you tend to any animals that leave your property.



2. **Handling practices**—Always handle sick animals last to prevent the spread of disease. Also, handle younger animals before handling older animals, as adults are more likely to have developed immunities/tolerances to diseases.

3. **Traffic control**—Keep your farm secure from unauthorized visitors. Any visitors should wear clean clothes, sanitize their footwear, or wear foot covers. Limit traffic near your farm and consider sanitizing vehicle tires that have been to other farms.

4. **Sanitation maintenance**—Sanitize new equipment and pens that may have been in contact with other animals. Clean off organic matter, such as feces and hair. Allow for proper drainage of urine and excessive water that may harbour disease. Remove manure and other debris that build up in and around pens. As a post-clean–up measure, spread hydrated lime to reduce odour and decompose manure and hay quicker.

5. **Hygiene**—Wash your hands, clothing, and footwear after visiting another farm. Use latex or rubber gloves when handling sick animals.

6. **Control pests**—Barn flies, rodents, and parasites can all be methods for spreading disease.

7. **Observation**—It's a good practice to observe healthy animals so you can notice any changes that may indicate when the animal is ill. Becoming familiar with disease symptoms ensures a quick response with isolation, treatment, and future prevention.

NOTE

For more information on biosecurity and tips for keeping your animals safe and healthy view the "*Biosecurity for Small Scale Livestock Production"* factsheet in the Appendix of this manual.

Common Goat Diseases

Coccidiosis

Cause: Goat ingests infected feces that contain intestinal parasites called coccidia.

Symptoms

- Kids can look and feel fine while the damage is being done
- Stunted growth, usually in kids less than seven months old
- Occasional diarrhea
- Dull and dry coat
- Reduced weight gain
- Sudden death

Treatment

- A veterinarian can check a stool sample for coccidia
- Sulpha drugs or amprolium

Prevention

- Prevent fecal contamination of feed and water
- Ensure all housing is sanitary, clean, and dry
- Wean gradually over a week
- Avoid overfeeding of milk
- Feed a coccidiostat to aid in prevention

Pneumonia

Cause: Usually caused by bacteria, but can be worsened by stress, poor ventilation, and overcrowding.

Symptoms

- Depression and general weakness
- Fever
- Loss of appetite
- Drooping ears
- A dry, hot nose
- Rapid, difficult breathing
- Coughing and gasping

Treatment

- Antibiotics
- Keep separate from herd
- Encourage eating and drinking

Prevention

- Control coccidiosis
- Good ventilation without drafts
- Reduce dust
- Adequate space

Scours

Cause

- Kids not fed colostrum soon enough after birth
- Dirty environment
- May be caused by bacteria, viruses, or protozoa
- Overfeeding

Symptoms

- Watery or discoloured feces
- Loss of appetite
- Fever
- Rough coat
- Weight loss
- Dehydration

Treatment

- Reduce the amount of milk given
- Feed electrolytes to replace lost body fluids
- Oral antibiotics may be necessary
- Isolate infected kids

Prevention

- Feed colostrum within an hour after birth
- Ensure all pens are kept clean and dry
- Disinfect navel in tincture of iodine right after birth
- Avoid overfeeding milk

Sore Mouth

Cause: Contact with virus or scabs.

Symptoms

- Small pimples that turn to scabs or blisters at the corner of the mouth, lips, or on the gums

Treatment

- Few medicines help
- Iodine can be rubbed into the lesions after the scabs have been removed to dry out the area and reduce infection
- Sanitary precautions to prevent further infection
- Animals usually recover quickly and then become resistant to infection
- Care should be taken since this virus also affects humans

Prevention

- Difficult to prevent unless you keep a closed herd
- Wash hands thoroughly after handling and don't allow children to cuddle goats because this is a zoonotic disease and can spread to humans

Mastitis

Cause: Infection of the mammary system or unclean milking practices

Symptoms

- Udders are swollen, hot, and painful Milk will change colour and can contain flakes

Treatment

- Antibiotic udder infusions

Prevention

- Use good sanitation practices at milking
- Keep goat in a clean, dry environment
- Treat dry goats at end of their lactation with a dry goat mastitis infusion

Ketosis (Pregnancy Toxemia)

Cause: When goats are in late pregnancy and are unable to consume enough food to keep up with the extra demand for energy, they metabolize fat from their body stores and produce ketones.

Symptoms

- Doe may be depressed, weak, or uninterested in food
- Doe has poor muscle control and balance
- Urine tests positive for ketone bodies
- If untreated, death occurs within a few days

Treatment

- Consult a veterinarian

Prevention

- Proper feeding of does throughout pregnancy

Caprine Arthritis Encephalitis (CAE)

Cause: Virus present in milk and colostrum of infected does.

Symptoms

- Kids experience paralysis
- Adults have swollen joints, paralysis, difficulty breathing difficulty and hard udders
- Many does carry CAE but do not show it

Prevention

- Feed kids pasteurized milk and heat-treated colostrum
- When purchasing new goats, make sure that they are CAE free
- Test does for CAE before breeding
- Lower milk production

White Muscle Disease

Cause: A shortage of vitamin E and selenium.

Symptoms

- Kids are born weak or dead
- Healthy kids suddenly become weak and die
- Digestive problems in young kids
- Respiratory problems in young kids

Prevention

- Give vitamin E–selenium injections to pregnant does at three to four weeks before kidding
- Inject newborn kids with vitamin E–selenium when they are one or two days old
- Consult your veterinarian

Johne's Disease (Wasting Disease)

Cause: Bacteria infects young goats before they are seven to eight months old. The infection thickens the intestines and interferes with the animal's ability to absorb nutrients.

Symptoms

- Seen in animals three to five years old; older animals may be susceptible but do not show symptoms
- Affected goats slowly lose weight while temperature and appetite remain normal
- Diarrhea may develop during the last few days before death occur

Treatment

- Diagnosis can be made by blood sample or fecal culture. The disease is fatal and there is no known cure.

Prevention

- Purchase new or replacement animals from disease-free herds
- Isolate young stock from mature animals
- Provide good sanitation

Pregnant women should avoid contact with goats at kidding to avoid exposure to possible zoonotic diseases that can transfer to humans and cause health complications.

Parasites

Parasites can be internal, meaning they live inside the goat, or external, meaning they live on the goat's coat. Parasites can be a major issue for goats and can lead to disease, emaciation, anemia, irritations, and death. Thus, it is important to use proper management practices to avoid parasite infestations. Housing should be kept sanitary and manure routinely removed. Try to avoid feeding on the ground to minimize the chance of a goat ingesting a parasite. Proper pasture rotation can also be helpful in breaking the parasite lifecycle.

Many dusts and sprays are available through your vet for external parasites, such as lice. Fecal exams can be done to identify and selectively treat internal parasites present in your herd. Parasite resistance to treatment can be a significant issue, so it is important to work with a veterinarian to design parasite-management strategies.

Vaccinations

The threat of some diseases can be partly eliminated by vaccinating your goats. Most veterinarians recommend vaccinating for clostridium perfringens type C and D as well as tetanus (CDT). Tetanus is caused by a toxic organism that lives in the earth. It can easily enter a goat's body though a cut or puncture wound. The CDT vaccine also protects against enterotoxaemia. The CDT vaccine can be given to does during their fourth month of pregnancy. Kids are vaccinated at one and two months of age, then given boosters annually.

Talk to your veterinarian to design a vaccination program for your herd. If you have only a few goats, you might have your veterinarian vaccinate them for you. If you have several goats, you might want to learn how to give vaccinations yourself. Any injections given to a goat for the meat market should be given in the neck area. This avoids damage to the choice cuts of meat.

ANTIBIOTICS

Antibiotics may be necessary to cure a goat of a bacterial infection. If a goat has recently received antibiotics, it needs to go through a withdrawal period before it can be slaughtered for meat. If residue levels are detected, the meat or meat product are prohibited from sale.

Section 5: Breeding

Genetics

To build a quality herd, you need to start with good breeding stock. Ask yourself this: What good traits do goats in your herd have, and what improvements could you make through breeding?

The first step to improving your herd is to evaluate your herd as a whole and then evaluate each goat individually against their breed standard.

If a doe has a strong mammary system but weak feet and legs, you may select a buck whose offspring have strong feet and legs, but whose udders may not be as reliable. The improvement of your herd depends upon its genetic makeup. Some characteristics will be more influenced by genes then others. The ability of a gene to be passed to the offspring is determined by its heritability strength. Some examples of heritability of certain goat traits are as follows:

Trait	Heritability (%)
Number of kids	54–57
Age at first kidding	50
General body weight	49–77
Birth weight	25–40
Total milk yield	10

A breeding system looks at the relationship between the doe and the buck. There are five different breeding systems to increase trait quality in the offspring:

1. **In breeding**–Mating closely related animals, such as brothers and sisters or parents and offspring.
2. **Line breeding**–Using a succession of related bucks that are not more than 25 per cent related.
3. **Out crossing**–Mating two unrelated animals within the same breed. This system will likely increase hybrid vigor and reproductive performance.
4. **Cross breeding**–Mating of two different breeds.
5. **Grading up**–Continued mating of grade (unregistered) does to purebred sires to upgrade animals and their offspring until they qualify as Canadian for their breed. This is 7/8 for does and 15/16 for bucks.

Breeding Ages of Bucks and Does

Bucks and does can breed at three months old, so they must be separated at an early age to ensure there is no accidental breeding. It is preferable to wait to breed bucks until they are six months or older. In its first season, a young buck can service upwards of two to three times a week. In its second year, it can service an average of 20 does a season and upwards of 40 does a season in later years.

Does should only be bred once they have had sufficient time to develop. They should be at least 36 kg (79 lbs.) and have a heart girth of 75 cm (4.5 in.) before they are bred. Milk goats reach their prime for milk production around four years of age. However, a goat in good health may continue to be a useful milker and breeder for over 10 years.

Artificial Insemination (AI)

Buck's semen can be successfully collected, frozen, and stored. There are hands-on courses available to teach AI skills so the goat owner can perform it themselves. Achieving good conception rates with AI may be difficult because of inaccurate timing of insemination and incorrect placement of semen. However, AI does offer some benefits.

- You do not need to own a buck.
- AI may increase the rate of genetic improvement.
- You have a greater variety of bucks to breed to.
- It reduces the possibility of transmitting a disease or parasite to your doe.
- You can carefully regulate the time of breeding and kidding.
- It promotes good record keeping of dates, heat, breeding, pedigrees, etc

Breeding Season

Goats are seasonal breeders, with the breeding period occurring from mid-August to March when the number of daylight hours decreases. However, pygmy goats are year-round breeders and Boer goats breed from September to March.

April through August is considered out of season; however, goats can be manipulated to breed out of season by using hormone treatments or by adjusting the amount of light they receive. You should decide on a breeding schedule to maximize your farm's productivity while taking labour, cost, and facility capabilities into account.

Assessment of Breeding Schedule Options			
Scheduling Strategies	**Description**	**Advantages**	**Disadvantages**
Natural breeding season	Does are bred from late August to mid-March. Kidding occurs from February through April.	Shortest work-cycle, one period per year; kids uniform at weaning if breeding is concentrated	Meat goat sales not coordinated with all major market peaks within breeding year

Continuous breeding	Bucks and does are left together year round in hopes some out-of-season breeding will occur.	Some availability of meat goats for most seasons	Kidding to be managed in most seasons; not coordinated with market-demand cycles and peak volume is limited. Does will need to be closely monitored to ensure they maintain healthy condition. Increased feeding costs should be expected to ensure does maintain a healthy breeding condition. This breeding strategy is not recommended for both financial and animal welfare reasons.
Extended natural breeding	The natural breeding season is lengthened by using lighting or hormone treatment. Kidding is extended to seven or eight months each year.	Can match market cycles for meat goats, including managing breeding by groups	Cost of lighting and hormone treatments; longer breeding management cycles
Accelerated breeding	Shorten weaning period, enhance nutrition, use lighting or hormone treatment. It enables kidding three times in two years.	Greater number of kids per doe; goat meat availability more consistent	Cost of lighting and hormone treatments; requires rapid weaning and advanced nutrition program

Estrous Cycle
During the breeding season, the doe's ovaries produce an ovum every 17 to 21 days. This period is known as the estrus cycle. The does are in heat for a short time during this cycle and will show interest in the buck and want to breed. It is important to recognize signs of heat in does because the heat period is very short: 18 to 24 hours. After this time period has passed, the does may not be willing to stand for breeding.

Signs of heat include but are not limited to the following:

- Tail flagging
- Restlessness, bleating, and little interest in eating
- Does fighting with each other
- Slight swelling of the vulva
- Does trying to mount each other
- Clear mucous discharge, which turns whitish at the end of the heat period; the hair will become sticky and glued together during heat

Breeding Problems
There can be various reasons as to why a doe may not conceive once it has been serviced:

- Doe was bred at the wrong time
- Infertile buck or doe
- Ovary problems
- Infection in the uterus or cervix
- Health problems other than reproductive
- Nutritional problems in does

Gestation
Gestation is the length of time from conception to kidding and can range anywhere from 145 to 155 days. The average time is usually 150 days (about five months). Young does often give birth to one or two kids in their first kidding. Older does will have twins, or occasionally triplets. Once in a while, a doe will have quadruplets.

Kidding and Kidding Problems
A doe may show one or more of the following signs a few days before kidding:

- The udder will begin to fill up with milk.
- The doe's backbone ahead of the tail will become raised and loose feeling.
- The doe's vulva will become swollen and pink.
- The doe may lie around and breathe loudly, or make small grunting or groaning sounds between chewing mouthfuls of cud.

You may clip a does' udder, hindquarters, and tail a few days before the doe is due. The doe should be kept in a small, clean pen by itself. Close to kidding, the doe may:

- become restless and begin pawing at the bedding

- look as though it is listening for a noise or make small cries
- lie down and get back up repeatedly

Once the doe is in labour, it will push out a water-filled birth sac. In a normal delivery, the kid's front feet should appear with a small nose resting between the two legs.

After some harder pushing, the kid will continue to come out. The doe may be lying down or standing up as this is happening.

Finally, the kid will be pushed out completely. The umbilical cord may still be unbroken and it should be snipped off about 10–15 cm (3.9–5.9 in.) from the kid using sharp, clean scissors. Immediately after cutting, dip the navel in iodine. This helps to prevent any bacteria from entering the kid's body.

You should suspect problems if

- the doe does not produce a kid within 20 minutes of fairly hard pushing
- the water sac breaks, but no kid appears even after several minutes of pushing
- the doe is in an abnormal amount of physical distress

If you suspect problems, have an experienced goat breeder examine the doe or contact a veterinarian. Many kidding problems can be easily solved but you must catch them early.



Image Copyright: Ontario 4-H Council

Newborn Kid Care

After the kids are born, check that they are all breathing. Dry the kids with a clean towel and ensure their nasal passages are clear. Make sure the birthing pen is warm enough and use a heat lamp or radiator if necessary. Inject kids with vitamins and minerals as directed by a veterinarian. Identify the newborn goats using coloured or numbered neckbands, which can be replaced by a more permanent method of identification in the coming weeks. Check that the doe is producing colostrum and that she passes the placenta within six hours following birth. Ensure the doe is eating and is in good health.

For meat goats, move the doe and its kid(s) into a temporary pen and supply feed and water. Ensure the doe's teats are clean and all the kids can nurse. Help the kid only if it doesn't start nursing on its own within 15 minutes. Meat goats should be separated from their dams before three months of age to prevent accidental breeding.

For dairy goats, remove the kid from the dam. Place the kid in a clean pen with other newborn kids and move the doe into a milking pen. Bottle feed the kids colostrum.

Section 6: Business and Production

Milk from Dairy Goats

Goat's milk is not a supply-managed commodity in Canada, so no quota is required to produce goat's or sheep's milk for sale. However, a producer licence must be obtained from the Natural Products Marketing Council.

If the goat's milk is sold directly to a processor, the producer does not require any further licences. However, if the producer is also processing the milk, either selling pasteurized fluid milk to retail outlets or the final consumer, and/or processing the milk into cheese, butter, yogurt, ice cream, or other dairy products, additional licences are required.

There are some regulations that apply to all milk producers. All milk producers must adhere to the Dairy Industry Act and accompanying regulations, which have stipulations that cover the following aspects of dairy production:

- The farmyard
- Barn construction
- Barn water supply
- Milking parlour construction
- Milk house construction
- Bulk milk tank specifications
- Milk handling equipment
- Hygiene during milking operations
- Animal health requirements
- Handling and transport of bulk milk
- Milk transport vehicles
- Milk transfer
- Criteria for raw unpasteurized milk. Note that this refers to unpasteurized milk sold for processing, not unpasteurized milk sold to consumers, which is not permitted.

There are other regulations that apply to dairy farms in Nova Scotia, including municipal zoning regulations and environmental regulations. For more information on municipal zoning regulations, contact your municipal office. For more information on environmental regulations, contact your agricultural resource coordinator with the Nova Scotia Department of Agriculture.

Goats can be milked by hand or by an automated milking system. A small commercial farm may milk up to 120 does; a mid-sized farm may milk between 120 and 300 does; while a large dairy operation would milk well over 300 does. Herd size determines the size of the milk parlour and milk house as well as the type and capacity of milking equipment used.

Milking Parlour and Milk House

Your milking parlour is where you will milk your does. You should provide a holding area near the parlour's entrance to help manage traffic flow and to hold milking groups in the order they will be milked in. Milking parlours may be a raised platform, a pit-type, or a hybrid/semi-pit. Raised platforms should be at a height that is comfortable for the operator, around 61 to 91 cm

(24–36 in.). They should also have a ramp or steps that are no more than 36 cm (14 in.) high so the goats can access the platform.

You should work with an experienced equipment dealer to design and install a dairy goat milking system. If you're using a pipeline system, you must install and maintain a pipeline to carry milk from the milking units to the receiver jar and the bulk tank. Low lines are installed below the milking stalls and are more commonly used in pit-style parlours. They provide a more stable milking vacuum than high lines, which are installed above the milking stalls. No matter what system you use, ensure all the material in the facility is non-toxic and easy to clean.

The goal is to milk the goats quickly and expose them to as little stress as possible. Having milking equipment that works well is crucial to having a smooth, problem-free milking process. Milking equipment should be tested regularly, about once a year, to ensure it is working properly.

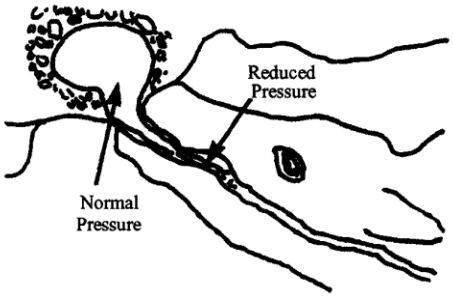
For fast milk-out, the vacuum pressure should be set at 12 inHg and milking equipment components (vacuum pump, milk lines) sized according to the number of milking units used. If the vacuum is too weak, the teats will not be massaged enough and they can become irritated. A pulsation ratio of 60:40 (liner open 60 per cent of the time and closed 40 per cent of the time) is recommended. If a wider ratio, such as 70:30 is used, once again, there may not be enough time spent on teat massage.

Your milk house contains your bulk tank. The bulk tank should be sized to hold the maximum milk production of the peak planned herd size between pick-ups plus one milking. Provide a pressurized cold potable water and wash-up hose for rinsing the bulk tank and milk house floors. The milk house should have good drainage to ensure any potential contamination flows away from the milk house and parlour. The walls and floors of the milk house should be smooth, impermeable, and easy to sanitize. Other equipment you should have in your milking parlour or milk house includes

- strip cup
- teat dip cups
- separate drop pail/unit for fresh and treated does
- shovels for cleaning up manure
- dipper for sampling milk from the bulk tank
- pressure washer, hose, and brushes for cleaning the milk house
- water heater with high temperature thermostats to provide hot washing water
- backup generator to power equipment

Milking

After kidding, a doe will begin its lactation and produce milk. During the first two days of the lactation, colostrum is produced. After this, the milk will change to regular milk and it will continue to be produced for approximately the next 10 months, as long as the kid is nursing or the farmer is milking the goat. Does are milked at least twice a day. When milking, you should milk groups in the same order every time. Milk lactating doelings first and milk does that have udder health issues, such as mastitis or high somatic cell counts, last.



Ontario 4-H Council

Image Copyright: Ontario 4-H Council

You should carefully identify any goats that have been treated with antibiotics. They should be milked last with the milk line removed from the bulk tank. All milk from treated goats should be discarded until their milk has been cleared. Kids should not be fed treated milk either.

Cleaning and Sanitizing Milking Utensils

Milking utensils must be thoroughly cleaned before and after each milking to prevent bacterial contamination. It is important to follow the instructions on the labels of all chemical solutions.

1. Rinse all the pails, buckets, and other utensils with warm water immediately after use.
2. Soak utensils in hot water and detergent for about five minutes to remove soil.
3. Scrub the utensils and all surfaces. An acid cleaner should be used instead of an alkaline detergent, as this will prevent mineral deposits from forming on the equipment.
4. Rinse each piece of the equipment with hot water.
5. Drain all pieces of equipment and utensils by placing them on a non-rusting rack and allow time for them to air dry.

The Correct Milking Procedure

Good milking practices are a must for your dairy goat herd. Long hair should be clipped from the udder, flank, belly, and tail. Have a clean, separate milking area. Stay calm and quiet in the milking area and be patient. Steps for a correct milking procedure are as follows:

1. Ensure all milking equipment is cleaned and sanitized before each use.
2. Thoroughly wash your hands before milking and consider wearing disposable gloves.
3. Allow each group to enter the milking parlour and position for milking.
4. Gently massage and wash the udder with udder wash to encourage milk let down.
5. Dry udders with individual paper towels before milking.
6. Milk the first two streams of milk from each half of the udder into a strip cup. Check for flaky or clotted milk. Discard this milk and do not allow it in your bulk tank as it may contain bacteria.
7. Milk out smoothly and quickly. Most goats milk out in two to six minutes. Milk until the automatic stop triggers or until the milk flow stops.
8. Massage udder to make sure all the milk is out.

9. Dip each teat in a commercial teat dip. This prevents bacteria from entering the teat canal and causing a mastitis infection inside the udder.
10. Allow goats to exit the parlour and return to their pens. Provide fresh feed and water to your goats.

Remember: Discard the milk from animals treated with antibiotics or any abnormal milk (colostrum, watery, flakey or bloody milk).

NOTE

For more information on starting a dairy farm, view "Getting Started in Small Scale Dairy Production." The link is provided in the Additional Resources section the end of this manual.

Benefits of Goat's Milk

Goat's milk has been found to be extremely nutritious. Tables 1 and 2 compare the nutritional makeup of goat's milk to that of other mammals.

Table 1. Average Composition of Milks of Various Mammals

Species	Water	Fat	Protein	Lactose	Ash	Non-fat Solids	Total Solids
Goat	87.00	4.25	3.52	4.27	0.86	8.75	13.00
Cow	87.20	3.70	3.50	4.90	0.70	9.10	12.80
Ewe	80.71	7.90	5.23	4.81	0.90	11.39	19.29
Human	87.43	3.75	1.63	6.98	0.21	8.82	12.75

Data from: Webb & A. H. Johnson. *Fundamentals of Dairy Chemistry.* Westport Connecticut, The Aui publishing Co., 1995.

Table 2 compares the specific vitamins found in goat's milk to that of milk from cows and humans. All of these factors will vary depending on the season, diet, and condition of the animal. The figures shown in charts and information about the contents of milk should be taken as averages. Vitamin A1 is expressed at international units per litre (IU/L), while all vitamins are expressed as mg/litre.

Table 2. Average Vitamin Content of Goat, Cow, and Human Milk

Vitamin	Cow	Goat	Human
Vitamin A1	1560.0	2074.0	1898.0
Vitamin D	-	23.7	22.0
Thiamine (B1)	0.44	0.40	0.16
Riboflavin (B2)	1.75	1.84	0.36
Nicotinic Acid	0.94	1.87	1.47
Vitamin B12	0.0043	0.0006	0.0003
Ascorbic Acid (Vit.C)	21.1	15.0	43.0

Data from: Parkash & R. Jenness, "The Composition and Characteristics of Goats' Milk: A review". *Dairy Science Abstracts*. 30 (2), pp. 67, 1968.

Milk fat—Goat's milk has a high proportion of butterfat, which gives goat milk a greater energy value per unit volume than cow's milk.

Lactose—The lactose content of goat's milk is slightly lower than cow's milk. Since some people have difficulty digesting the lactose in milk, goat's milk is an excellent alternative. For yogurt, the low lactose of goat's milk gives a less acidic and more palatable product than cow's milk.

Protein—The protein composition in goat's and cow's milk is nearly identical. However, the physical characteristics of the curd differs between the two animals. Cow's milk has a harder and larger curd compared to goat's milk. Generally, the softer and smaller the curd, the easier it is to digest.

Minerals—Goat's milk generally contains more calcium, phosphorus, chlorine, magnesium, and potassium than cow's or human milk. The high chloride content may have some bearing on its laxative properties. Also, the amount of phosphorus contributes to the higher buffering capacity of goat milk, which makes it valuable in treating stomach ulcers.

Vitamins—For adult milk drinkers, goat's milk provides approximately twice the amount of vitamin A than cow's milk. Goat's milk is 50 per cent richer in vitamin B than cow's milk and four times as rich as human milk. Vitamin B helps the nervous system, increases the intake of sugar and other carbohydrates, and aids in protein digestion and metabolism. Goat's milk is also high in riboflavin (vitamin B2), which affects growth.

Ensuring Quality Milk

Some people believe goat's milk does not keep sweet as long as cow's milk. However, tests show this is not true. The keeping quality depends on the conditions under which it is produced

and handled. Good goat milk does not have a stronger flavour than good cow's milk. If your milk has a strange or strong taste, check the following points:

- **Keep the buck in separate quarters—**Male goats have a distinctive odour during breeding season that can transfer to the milk if they are kept near does. All conscientious goat breeders keep the buck in separate quarters, at least 15 m (50 ft.) from milking does.

- **Make sure your animal is healthy—**Your does should be sleek-looking and appear alert, without abscesses or growths. If the doe seems ill or listless, consult a veterinarian and have the milk tested.

- **Check your shelter—**Dirty and poorly ventilated barns can affect the flavour of milk.

- **Keep milking conditions sanitary—**This means the goat, the building, and the utensils need to be kept clean at all times. The animal should be clipped, particularly in the udder area to prevent loose hairs, dust, or dirt from getting into the milk during milking. Thoroughly wash and sanitize all utensils after each milking and keep them in a clean place. A malty flavour can develop from improperly cleaned equipment. Metallic flavours can be picked up from old or exposed copper equipment, milk cans, or lids. Old tin-plated equipment that has begun to wear can cause an oxidation process that results in a tallow-like flavour. Licensed milk producers are only permitted to use stainless-steel equipment and this is a good practice to follow even if you are not producing milk for sale.

- **Refrigerate milk quickly after milking—**Milk may develop an acid or coarse taste as a result of bacterial growth. A rancid flavour can also result from extreme agitation of warm raw milk in the presence of air. Ideally, milk should be carefully strained and stored in seamless aluminum, stainless steel, or glass containers. Plastic may impart an unwanted flavour.

- **Use your fresh milk within a few days—**If it is held too long at low temperatures, it may develop a sour taste. This is caused by a change in lactose developing into lactic acid.

- **Time during lactation—**During the latter part of the lactation, the milk of some does may begin to develop a flavour. Occasionally, but very rarely, an animal is found with poor-tasting milk.

- **Protein and butterfat content—**Bad-flavoured milk can result if the protein percentage becomes higher than the butterfat percentage.

Goat Meat Management

There is limited demand for goat meat in Nova Scotia, primarily in ethnic and gourmet markets. Goat meat is a delicacy to some and is a lean, high-protein meat. Kid meat has absolutely no fat

and is delicious if marinated in oil and herbs. Larger animals are dressed and cut similar to lamb and include chops, ribs, and roasts. Older animals provide excellent ground meat and curry, while bucks supply curry and salami.

Meat Slaughtering and Processing

Any meat sold in retail stores in Nova Scotia must be slaughtered at a provincially or federally inspected abattoir. Meat slaughter in a provincially inspected abattoir can only be sold within Nova Scotia. In order for Nova Scotia–produced meat to be sold outside of the province, it has to be slaughtered at a federally inspected facility. More than 20 abattoirs are licensed to operate in Nova Scotia and inspection services are provided by the government. To ensure meat is safe for consumers, all animals, slaughter processes, and carcasses at provincially permitted abattoirs are inspected by trained primary product inspectors appointed under Nova Scotia's Meat Inspection Act and Regulations. Further processing of meat or meat products is inspected and enforced by Nova Scotia Environment public health inspectors under the Health Protection Act and Food Safety Regulations. Provincial inspection contributes to the general surveillance of key food safety, animal health, and animal welfare issues in provincial livestock and poultry populations.

Provincial inspection is provided to abattoirs free of charge so it is not onerous for small-scale abattoirs. This allows farms the opportunity to develop their own on-farm facilities for meat slaughter and meat processing. If you are interested in operating a meat-processing establishment (abattoir, slaughterhouse, meat shop, or retail outlets, including mobile retail truck), you will require a Meat Slaughtering and Processing License issued by the Food Protection Section of the Nova Scotia Department of Environment.

Note: On-farm slaughter and farm-gate sales are only allowed where producers do not sell or intend to sell the meat or meat product, or use the meat or meat product for other commercial purposes. Any farm gate willing to sell processed meat or meat products through a retail shop on their farm requires a permit from the department and can only sell inspected meat. It is illegal to operate farm gate for commercial purposes without inspection in Nova Scotia. Failure to comply with provincial regulations could result in enforcement action.

It is a good idea to read over the Meat Inspection Act and talk to a senior meat inspector. For more information or questions about the provincial meat inspection program, contact your local district Nova Scotia Environment office.

NOTE

For more information on the Meat Inspection Act, or to learn more about obtaining a Meat Slaughtering and Processing Licence, view the links listed under Additional Resources.

Fibre Management

Fibre goats are primarily raised for mohair from angora goats, or cashmere from goats with a fine and long secondary hair coat. Fibre diameter is the single most important economic consideration for mohair and cashmere producers. While fibre diameter can be decreased by limiting the energy and protein in a diet, total fleece yield is negatively affected. Fine fibre should not be produced at the expense of the animal's health. Underfeeding can decrease the reproductive capacity and productivity of an animal, as well as increase their susceptibility to disease.

Shearing

The area in which you will be shearing should be well ventilated, large, and clean. When shearing goats, you should consider the time of year, climate, and available shelter so the goats are not too cold. Minor cuts and scrapes while shearing will not have a detrimental effect on the goat; however, steps should be taken to minimize this. Remember that goat's skin tends to be looser and softer compared to sheep and extra care needs to be taken. Special goat combs that have teeth closer together and tips tapered back are safer to use on goats. Be aware that certain diseases can be spread via contaminated shearing equipment. All shearing equipment should be treated with a disinfectant between herds and between infected animals within a herd. Animals should be sheared from youngest to oldest, with infected animals being sheared last.

Record Keeping

Records keep track of a herd's performance, health, daily management, and ancestry. Records of expenses and receipts are important and can help in determining the productivity and profitability of your herd. Be sure to keep your records in a convenient place and keep them up to date. You may wish to include some of the following information in your records.

Types of Records

Pedigrees—These records show the family tree of each individual animal. It lists the sires, dams, grand sires, grand dams, and great-grand sires and dams. It also includes the colour and senior weight of each animal. Pedigrees are important because they can establish that your animal is purebred, and show ancestry, so you can avoid accidentally inbreeding.

Herd records—This record lists the sex, sire, dam, date of birth, weight, and the date the animal leaves your farm for every individual animal. Comments such as buyers' names or show winnings can be added to help keep track of each animal.

Breeding record—Each breeding is recorded on this record. It will help you keep track of birth dates and help you decide which animals are productive and worth breeding.

Show record—A show record includes the dates and places of shows entered plus information on classes and awards received.

Health records—Health records should include any symptoms or possible signs of disease and the date they were observed in each animal. If the animal receives any medication, the amount and the date must be recorded. Health records can help keep track of the withdrawal period for medication that must be adhered to before an animal can go to market.

Feeding records—These records should include the type and amount of feed given to each animal. The record can also track the overall feed costs of your operation. Feeding records can also help you design and implement feeding programs according to the life stage of your animals.

NOTE

For examples of record templates see the Appendix at the end of this manual.

Additional Resources

- Fencing Guidelines: https://novascotia.ca/thinkfarm/documents/fencing-guidelines-2013.pdf
- Getting Started in Small Scale Dairy in Nova Scotia: https://novascotia.ca/thinkfarm/documents/getting-started-in-small-scale-dairy-production.pdf
- Goat Association of Nova Scotia: https://goatsnsdotcom.wordpress.com/
- Goat Scorecards: http://www.goats.ca/wp-content/uploads/
- Guide for Beginning Farmers in Nova Scotia: https://novascotia.ca/thinkfarm/documents/beginning-farmers-guide.pdf
- National Farm Animal Care Council Codes of Practice for the Care and Handling of Goats: http://www.nfacc.ca/codes-of-practice/goats
- National Farm Animal Care Council Transportation: http://www.nfacc.ca/codes-of-practice/transportation
- Nova Scotia Premises Identification Program (PID): https://novascotia.ca/agri/programs-and-services/industry-protection/
- Meat Inspection Act: http://laws-lois.justice.gc.ca/eng/acts/M-3.2/page-1.html#h-1
- Meat Slaughtering and Processing Licence: https://novascotia.ca/sns/paal/agric/paal011.asp
- Ontario Goat: https://ontariogoat.ca/
- Pasture Management: http://nsnewfarmer.ca/home/livestock/
- Maritime Pasture Manual: http://www.perennia.ca/portfolio-items/forages/?portfolioCats=124
- The Canadian Goat Society: http://goats.ca/

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Appendix A: Traceability in Nova Scotia

The Canadian Food Inspection Agency is proposing changes to traceability that will affect cattle, sheep, goats, pigs, bison, and deer. Currently cattle, sheep, and pigs require tags, and only pigs require movements to be reported. Moving forward all listed species will require both tags and their movements to be reported.

Traceability has three major components:

1. **Animal Identification**—All animals will be required to be identified with individual animal ID tags, most of these tags can be purchased at local feed stores or online directly from the Canadian Cattle Identification agency http://canadaid.com/

2. **Premises Identification**—All sites where livestock are housed or assembled will require a Nova Scotia PID number issued to them.

Any livestock producer in Nova Scotia can apply for a Nova Scotia Premises ID number at no charge to them. This is a one-time application and the issued number stays with the farm property regardless of changes in ownership, species, or animals etc. The same number is used when ordering tags and reporting movements for all animals regardless of species.

A premises ID number can be used in trace back of animals for emergency measure such as food recalls or animal disease out breaks. Producers can apply for a NS premises ID number at www.novascotia.ca/agri/pid/ or by phoning 1-902-890-9840

3. **Animal Movements**—All movements of regulated species between premises will need to be reported to the responsible administrator for that species:
    - Canadian Cattle Identification Agency for cattle, sheep, goats, bison, or deer
    - PigTrace for Hogs

The following information needs to be reported:

- Premises ID of departure and arrival sites
- Time and date
- Individual animal ID number
- Licence plate of livestock trailer

No reporting will be necessary for movements within a farm unit including:

- On-site pastures (pastures that are part of your farm unit)
- Other barn locations (heifer barns or other locations where animals are kept)
- Off-site pastures owned or leased (property where you are pasturing your animals only, not comingling with other producer's animals)

Appendix B: Biosecurity



Biosecurity for Small Scale Livestock Production

Biosecurity is the protection of people, animals, and the environment from infectious disease, pests, and other biological threats. It refers to the proactive measures taken to exclude threats from farms that are disease free, and preventing spread of pathogens to other herds or flocks if/when a disease does occur. The ultimate goal of a good biosecurity plan is to implement easily attainable protocols that reduce problems to inexpensive and manageable occasions. The following are the key components of any biosecurity plan.

1. **Fences:** Good fences keep livestock in and wildlife out. Inspect boundary fences regularly and repair as needed. Stray stock may spread disease and feral animals introduce new pathogens to your farm.

2. **Housing, Equipment, and Yard Maintenance:**
   - Pens should be completely emptied, cleaned, and disinfected at least annually.
   - All equipment that comes into direct contact with livestock or poultry should be cleaned and disinfected periodically, including feeders and waterers.
   - If sharing equipment with other farms, be sure to disinfect the equipment before using on your farm. Use your best judgement and weigh the risks carefully.
   - Prevent pests and rodents by:
     - Keeping area around pens free of debris
     - Cutting the grass short around pens and enclosures
     - Keeping feed in tightly closed containers and cleaning up spilled feed
     - Using traps and bait as necessary
   - Standing water should be drained.

For organic production, a robust biosecurity program can prevent the need for antibiotics and parasiticides, and can reduce the potential of GMO contamination or loss of certification.

3. **Introducing New Stock:**
    - Don’t bring new stock to your property if they appear unhealthy.
    - Avoid purchasing stock from markets and auctions.
    - Obtain a health certificate if possible.
    - Birds, eggs, and livestock should be sourced from farms with a solid herd or flock health program.

4. **Quarantine:**
    - Have a quarantine area available for animals new to the farm and for sick or injured animals.
    - This should be a separate area or building to prevent bird-to-bird or animal-to-animal contact.
    - Three weeks will allow time for a proper assessment of health, condition, and recuperation from transport or illness.
    - Observe animals or birds for any abnormal behaviour and signs/symptoms of disease. Presence of unusual behaviour or symptoms calls for veterinary inspection or tests.

5. **Water and Feed:**
    - Water should be tested at source to ensure its suitability for livestock production at least annually.
    - Design and position water bowls, troughs, and waterers to prevent fecal contamination.
    - Feed or ingredients should be purchased from sources that verify its safe origin.
    - Keep feed pest-free and dry, cover feed bins and feed systems to reduce the chance of contamination.

6. **Work Flow:**
    - Farm owners and workers should have separate clothing and footwear for working around various animal species. These should be kept at the barn entrance.
    - Use hand sanitizer or wash hands with soap and warm water before entering and after leaving livestock areas.
    - Work with the youngest and most susceptible animals first.

7. **Manure:**
    - Manure should be removed from the production area regularly.
    - Farms, even hobby farms and small stables, should have a manure management plan that includes collection, storage, moving, and disposing of manure to minimize chance of spreading disease.
    - Tools and equipment used for manure handling should not be used for feed or bedding.

8. **Herd or Flock Health:**
    - Contact your herd health veterinarian when livestock appear sick, mortalities are high, or production drops off without apparent reason. Low numbers of mortality should be examined by a vet if the cause of death is unknown.
    - Mortality should be disposed of in a timely manner to prevent contamination of the farm environment, reduce risk of spreading disease to other livestock and humans, and prevent attraction of pests.
    - When animals are stressed from parasites, weather extremes, etc., natural treatments may be less effective. Monitor carefully and resort to other options as necessary. As well, remember that sick animals benefit from remedial care.
    - Vaccinate as required (keeping the necessary records).
    - Pay attention to parasites. Fecal egg counts are useful in determining if treatment is necessary.
    - Keep records of treatments and veterinary care.

9. **Visitors/WWOOFers/Contractors:**
    - Discourage unannounced visitors.
    - All visitors must follow biosecurity protocol.
    - Designate a parking area for visitors.
    - Visitors should be accompanied by farm staff.
    - A visitor log is recommended.
    - Post “Biosecurity” and “No Entry without Permission” signs on entrance doors.
    - Keep extra footwear and outerwear (coveralls, smocks, etc.) for visitors.

Biosecurity is not limited to large-scale farms. Regardless of size or production philosophy, all farms, even hobby farms, have a responsibility to prevent an outbreak or spread of animal (or plant) disease or pests. Stay on top of industry association news. Be aware of local conditions or issues as they arise. **If there is a serious disease outbreak don’t be the last to know!**

There are national biosecurity standards for most livestock commodities.
These guidelines are a good place to start when developing a biosecurity plan for your farm.

http://www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/eng/1299868055616/1320534707863

For more information, contact:
Heather McLean,
Non-Ruminant Livestock Specialist,
Perennia

(902) 678-7722

www.perennia.ca

Appendix C: Record Keeping

Herd Record							
Name	Tattoo	Sex	Sire: Dam:	DOB	Colour	Date Sold	Comments

Inventory Record							
Animal ID (Name/#)	Registration #/Tattoo	Description (Breed, colour, marking, etc	DOB	Sex	Ownership Information	Purchase Price	Value
					o Raised o Purchased _____Date if purchased		
					o Raised o Purchased _____Date if purchased		
					o Raised o Purchased _____Date if purchased		

Breeding Record						
Dam	Sire	Date Bred	Date Birthed	No. Born Alive	No. Dead at Birth	Comments

Show Record						
Name of Show	Location	Date Entered	Identification Number	Classes Entered	Number in Class	Comments

Health Record								
Name/#	Breed	Sex	Age	Illness/ Symptoms	Treatment	Date Treated	Cost of Treatment	Recovered from illness/ successful treatment

Death Record					
Name/#	Breed	Sex	Age	Date of Death	Cause

Feed Record		
Situation Description	Method of Feeding	Amount of Feed

Nutritional Value of Feed						
Name of Feed	Type of Feed	Cost of Feed	Amount fed per day	Protein %	Fat %	Fiber %

Appendix D: Activities for a 4-H meeting

Each chapter in this manual can serve as information and act as a guide to help you plan a 4-H meeting. This manual is meant to act as a starting point for providing you with knowledge to teach your members. As a leader you are encouraged to tailor your meetings to your groups interests and abilities.

The table below outlines a typical 4-H meeting and gives suggestions for the length of time.

Welcome, Call to Order & Pledge		10 min
Roll Call		5 min
Parliamentary Procedure	Minutes & Business	10 min
Topic Information Discussion	Use the manual as a guide to present information on the meeting's topic.	20 min
Activity	Time to apply the newly learned information. See the list of suggested activities below.	30 min
Handle the Animals	If possible, members may use this time to practice handling their animals.	20 min
Wrap Up & Adjournment		10 min

The following has different topic suggestions, information to discuss as well as some possible activities for each section of the manual. Ideally, one or two topics should be selected to discuss during each meeting. Try and select topics from different sections for each meeting so members are exposed to a wide variety of knowledge. As a leader, feel free to be creative and use a variety of activities to help your members lean. There are tons of worksheets available on various websites online for members to fill out. You can also invite experts and guest speakers to come in to talk to your members or arrange day trips to visit new locations.

Section 1: Selecting an Animal

Topic	Information	Activity
Parts of the Animal	Show members a labeled diagram of the animal. For younger or newer members begin with basic parts of the body. For older or more experienced members you can discuss more advanced topics such as skeletal or muscular structure.	Have members label the parts of the animal. This can be done by using a worksheet or have members take turns placing labels on an actual animal.
Animal Breeds	Teach your members about different breeds. Possible information to include is: Distinct breed characteristics, differences among the breeds or the history of a breed.	Some suggested activities are: • Have members match a picture of the animal to its breed. • Have members research and present the ideal characteristics of their chosen breed.
Choosing an Animal	Discuss particular features a member might want to look for in an animal. Make sure to include information on correct conformation and conformation faults.	Have members practice judging. The members should place the animals and give reasons for their placings using the correct judging format.
Purchasing Stock	Outline your members' options for where they might purchase an animal. Discuss the pros and cons of purchasing from a private sale, a large breeding operation, an auction or breeding their own.	Organize a trip for the members to visit a breeding operation or an auction.

Section 2: Care and Management

Topic	Information	Activity
Housing	Discuss with your members the different options for housing their animals. Make sure to include information on the National Farm Animal Care Council Code of Practice.	Have members design their own farm using whatever materials they like such as modeling clay, popsicle sticks, paper etc… Have members present their farms and discuss their farms with the group.
Handling	Inform members and demonstrate how to proper handle the animal. This activity meeting can include information on animal behavior, proper handling techniques and safety tips.	Have members practice handling an animal while you observe.
Grooming	Teach members how to properly groom their animals. You can discuss basic grooming techniques as well as grooming an animal for show.	Have members assemble a grooming kit and take turns grooming an animal. They could bath, clip/shear, trim nails/hooves etc…
Identification	Discuss the importance of proper identification and tagging/tattoo animals.	Have members observe an animal being tagged/tattooed.

Section 3: Nutrition

Topic	Information	Activity
Digestive System	Teach your members about their animal's digestive system.	Have members label an image of the animal's digestive system and include brief descriptions on the functions of each part.
Essential Nutrients	Inform your members on what the essential nutrients are and why they are important to their animal's diet.	Have members complete a worksheet where they match essential nutrients to their function.
Classes of Feed	Discuss the different types of feed that are available for the members to feed their animals. Describe each feed and its pros/cons.	Have an animal nutritionist, feed salesmen, veterinarian etc. Come in and give a talk on animal nutrition.
Feeding Programs	Teach your members about their animal's nutritional requirements for their different developmental and life stages.	Instruct members to design a feed program for the different stages of their animal's life. Compare and contrast how a newborn is fed compared to the diet of a mature animal.
Body Condition Scoring	Inform members on how to score an animal's body condition, when to score, how often and why. Include some basic information on how a member could adjust the animal's diet to raise or lower a body condition score.	Have members practice palpating and scoring the body condition of an animal. Provide images of animals in different condition so members have a visual.

Section 4: Health

Topic	Information	Activity
Recognizing a Healthy Animal	Teach members how to recognize a healthy animal and what normal vital signs are.	Have members practice taking an animal's vitals.
Biosecurity	Inform members on the importance of biosecurity.	Have members discuss proper biosecurity practices and ways they can implement them into their own program.
Common Diseases	Discuss some common diseases, its cause, prevention and treatment.	Have a veterinary in, or visit a vet clinic, to talk about common disease and what members can do about it.
Parasites/Vaccinations	Inform your members on the importance of routine vaccinations as well as deworming.	Have your members design a deworming and vaccination schedule. If members are older and more experienced they may want to learn how to properly administer vaccines.

Section 5: Breeding

Topic	Information	Activity
Reproductive Cycle	Teach members about the animal's reproductive cycle.	Have members label diagrams of the animal's reproductive system.
Signs of Heat and Breeding.	Inform your members on the signs that an animal may be in heat. Proper breeding practices as well as natural vs artificial insemination may also be discussed.	Have members record what are some signs that an animal may be in heat. Then, have members discuss the advantages/disadvantages for natural service or artificial insemination. Also, you could arrange to have the members observe animals being checked for pregnancy.
Giving Birth	Discuss the stages of labour and some signs that there are some issues with the birthing process.	Have members fill out a timeline on the stages of labour with a description of each stage.
After Birth Care	Teach your members about what to do following the birth of an animal. Care for the newborn as well as the mother should be discussed.	Have members create an after birth care kit complete with towels, disposable gloves, buckets etc.

Section 6: Business and Production

Topic	Information	Activity
Marketing	Discuss with members the importance of marketing and some marketing ideas/tips.	Have members research potential markets for products from their animals. Alternatively, you could organize a trip to a dairy farm, specialty meat market, farmers market etc.
Record Keeping	Talk to members about why records are kept, how to keep them and what members should keep track of.	Have members fill out a record booklet throughout the year. You may use the record templates provided in this manual or use your own.